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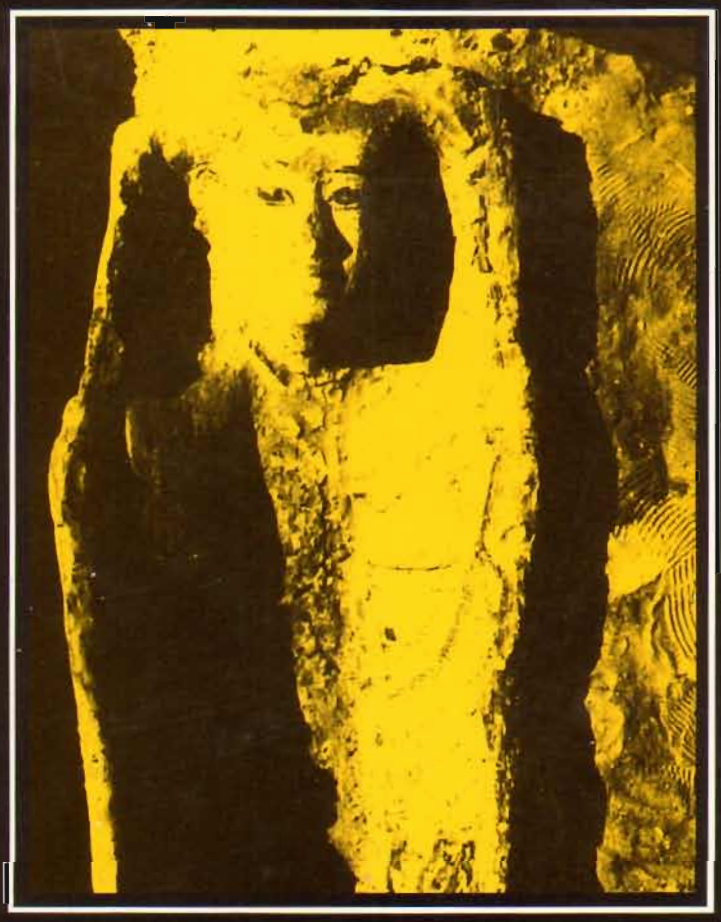

SECONDARY CEMETERY IN THE MASTABA OF PTAHSHEPSES AT ABUSIR

By
EUGEN STROUHAL
and
LADISLAV BAREŠ

CHARLES UNIVERSITY
Prague

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PUBLICATIONS

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LIST OF ABBREVIATIONS

l.	= length	s	= standard deviation	S	= south
w., b.	= width, breadth	V	= coefficient of variation	E	= east
h.	= height	min.	= minimum value	W	= west
d.	= depth	max.	= maximum value	$C_{1,2}$, etc.	= cervical vertebrae
th.	= thickness	R	= range	$Th_{1,2}$, etc.	= thoracic vertebrae
ø	= diameter	NpM	= Náprstek Museum, Prague	$L_{1,2}$, etc.	= lumbar vertebrae
prom.	= prominence	EgM	= Egyptian Museum, Cairo	$S_{1,2}$, etc.	= sacral vertebrae
circ.	= circumference	M	= male	$I_{1,2}$	= incisor
no.	= number	F	= female	C	= canine
tab.	= table	Ch	= child	$P_{1,2}$	= premolar
fig.	= figure	juv.	= juvenile	$M_{1,2,3}$	= molar
pl.	= plate	R, d.	= right	$mi_{1,2}$	= milk incisor
n	= number of individuals or cases	L, s.	= left	c	= milk canine
$\bar{x}$	= arithmetic mean	y	= year	$m_{1,2}$	= milk molar
m	= standard error of the mean	N	= north		

INTRODUCTION

The Mastaba of Ptahshepses at Abusir near Cairo has undergone a number of changes since it ceased to fulfil its primary function of burial and mortuary rites. The dead were, on repeated occasions, disturbed by grave robbers, who made their way into the spaces above and below ground. The noble white limestone of the blocks lining the walls of the Mastaba, which had come from quarries close to present-day Tura on the opposite right bank of the Nile, and the less valuable blocks of local limestone of the core of the building, were removed by the quarry workmen dismantling the Mastaba even before its secondary mortuary function began, and again later, in the Roman period, when stonemasons' workshops were set up in the immediate vicinity, and a broad area around was supplied with building material.

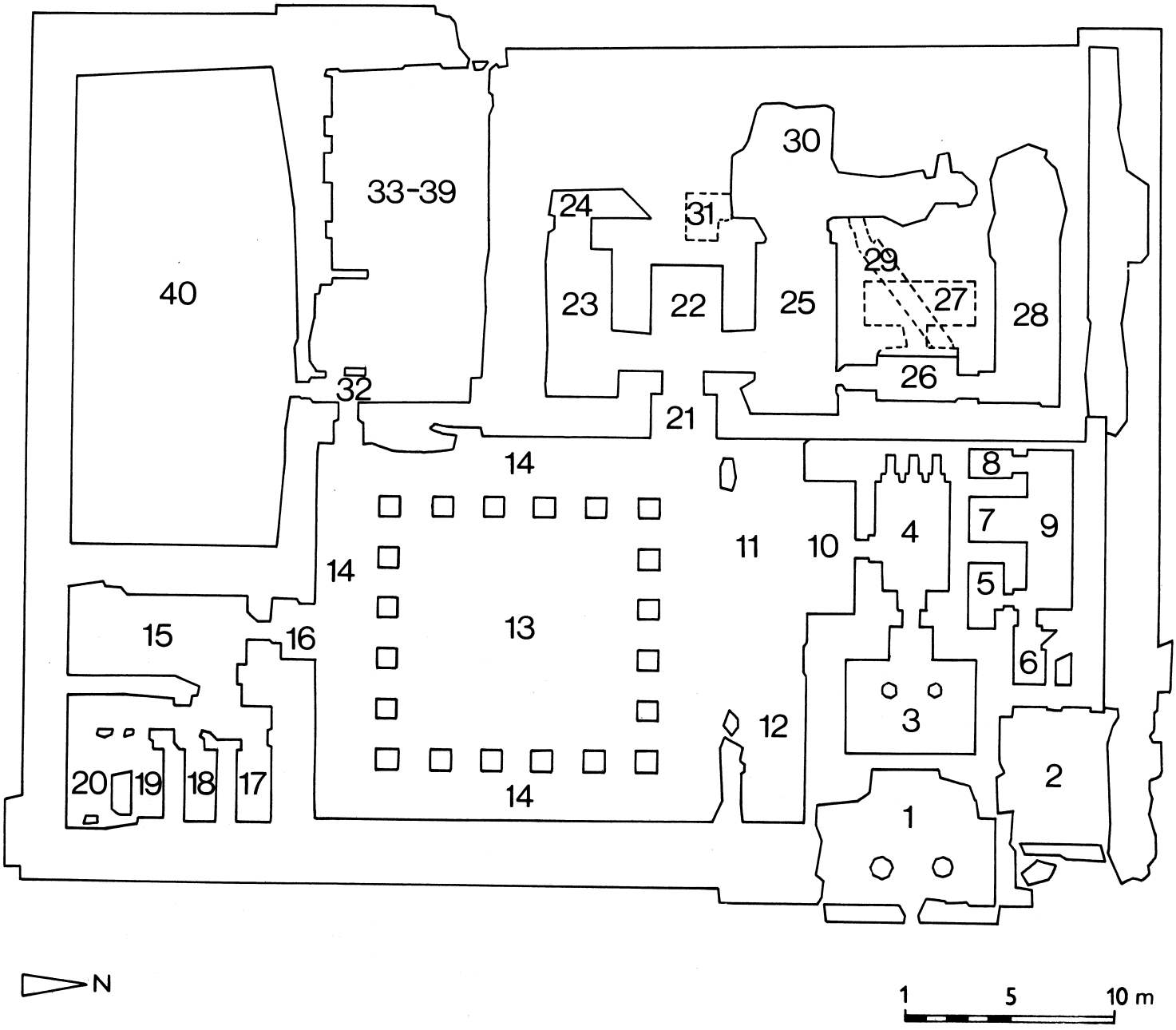
In the Late Period, beginning with the Saitic and continuing into the Greek period, the funerary function of the Mastaba was revived. At that time it was no longer the exclusive tomb of a person of the upper strata and members of his family; in its ruins a densely crowded burial-ground of commoners gradually came into being. The simple graves with or without coffins and with but humble funeral equipment point to the relatively poor inhabitants of what will have been an agricultural settlement not far away, perhaps the predecessor of the present-day village of Abusir, which lies in the vicinity of the town of Mennofer (Memphis).

The location of the burials in the Initial Mastaba (i. e. the oldest part of the tomb that was built by stages) shows that the dead were placed into a substantially broken down Mastaba, from which the wall casing of the rooms had been removed. Most burials were found in the disturbed area above the burial chamber. The confusion, often complete disarrangement of these burials shows that the Mastaba continued to be robbed and heavy stones removed even after the dead had been laid to rest.

During excavations of the Mastaba of Ptahshepses by the Expedition of the Czechoslovak Institute of Egyptology of Charles University in Prague under Professor Dr. Z. Žába in the 1966 season, the first burials of this secondary cemetery were discovered in the area of the south-eastern store-rooms (rooms 15—20, plan 3). There were five burials, which Professor Žába labelled with the letter D and the number of the find. They were excavated and documentation was worked out between 22 October and 21 November 1966. In that period six further burials were discovered outside the Mastaba proper, to the E and S of its SE corner. These burials were likewise labelled with the symbol of the south-eastern store-rooms D (D 226—D 335), although they lie in an area later marked with the symbol J. In this publication we have kept to the original marking (plan 4), but the burials are included among the rest of the materials from the area around the Mastaba (I and J).

The area most intensively used for secondary burial was the Initial Mastaba (rooms 21 to 25 and the disturbed area above burial chamber 30, plan 1 and plan 2). The Initial Mastaba was excavated by the expedition led by Z. Žába in 1968. The burials were given numbers in order of sequence with the symbol A (meaning anthropological find). Their excavation was supervised and concurrently recorded by Dr. E. Strouhal C.Sc. in the period 18 March to 20 May 1968. As was current practice in the expedition the archeological finds that accompanied the burials were marked with the letters of both areas, into which the Initial Mastaba was divided (E — rooms 21, 22, 25, and 30, F — rooms 23 and 24). Two isolated fragmentary finds of human bones came from area H, originally used to house the funerary ships (see the survey map of the Mastaba). The rest of the internal space of the Mastaba was not used for the purposes of the secondary cemetery so that it would seem that the burials were intentionally centred around the burial chamber and in the mortuary chapels of the Initial Mastaba. In this connection it should be noted that in the area above the burial chamber lay entire piles of completely mixed-up and scattered human bones, which gave the impression as if they had been intentionally thrown into the area from which the original ceiling had been removed. If this should be the case, it can be assumed that the original place of burial was in the vicinity of the tomb, at a site that is not known.

The other part of the cemetery lay outside the Mastaba, in the area between its external stone wall and the enclosure wall of sun-dried mud bricks. Some graves were set directly into the wall of mudbricks. Burials continued even outside this wall, and it can be assumed that the cemetery was connected with a secondary cemetery found in the



Survey Plan of the Mastaba Showing the Location of Single Rooms (1–40).

Mastaba to the S of the Mastaba of Ptahshepses (Schäfer 1908). The burials on the W side and the W halves of the S and N sides were marked with the letter of area I, the burials on the E side and the E halves of the S and N sides with the letter of area J. These burials were excavated and recorded by the expedition led by Z. Žába in 1970 (I 273–I 337, J 394–J 1896), while Dr. F. Váhala, C.Sc. was commissioned to do the documentary work. Investigations were completed by the expedition led by Dr. Váhala in 1974 (I 374–I 470, J 1946–J 1976). Excavation and documentation was entrusted to Dr. L. Bareš and Dr. P. Charvát, C.Sc.

The work in hand is a further volume in the series of publications of the Czechoslovak Institute of Egyptology of Charles University on the Mastaba of Ptahshepses. It follows up the "Preliminary Report on Czechoslovak Excavations in the Mastaba of Ptahshepses at Abusir" (Charles University, Prague 1976). The author of chapters 1, 4, 7 to 15 is E. Strouhal, chapter 2 and 3 were written by L. Bareš, chapters 5, 16 and 17 are the work of external collaborators, and chapter 6 was composed partly by external collaborators, partly by the two authors of this publication.

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We further owe a debt of gratitude to the staff of the Egyptian Antiquity Organisation, in the first place, to its former Director-General Dr. Gamal Mokhtar and its present Director-General Dr. Ahmad Kadry, for their invaluable support in the excavations of the Mastaba of Ptahshepses at Abusir. We would like to thank the Inspectors of the Organisation Messrs Mamduh Abdeel-Zaher, Ali el-Kholi, Ragab Abd el-Haq, Girgis Dawud, Muhammad el-Saghir and Lotfi Farid. The successful course of the excavations owes much to the foreman of the workmen, the late rais Abdo el-Kereti, and his labourers from Quft and Abusir.

We think with gratitude of all members of the team of excavators working on the Mastaba of Ptahshepses, four of whom, Professor Dr. Z. Žába, CSc., Dr. F. Váhala, CSc., Dr. E. Hnátek and Docent Dr. Z. Uherek, CSc., alas, did not live to see our publication. It is to their memory that we dedicate this book.

We would like to express most sincere thanks to all our collaborators, who undertook to work out specific problems and have contributed articles and chapters of this publication. We are also endebted to Dr. Till Gottheiner for the translation.

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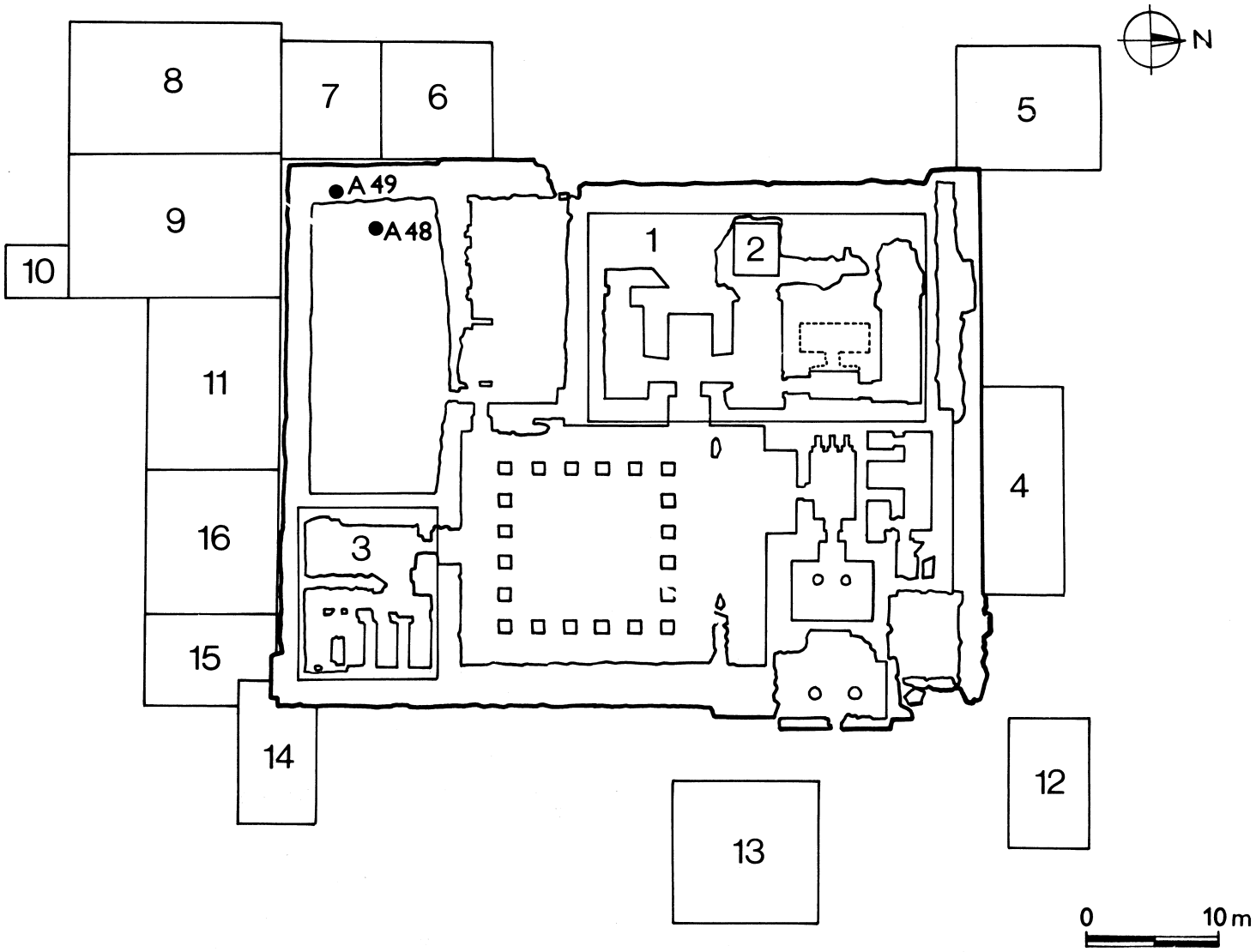
EUGEN STROUHAL AND LADISLAV BAREŠ

Prague, June 27, 1983.



Survey Plan of the Mastaba Showing the Localization of Detailed Plans and of Isolated Finds A 48 and A 49

CATALOGUE OF BURIALS INSIDE THE MASTABA

A/ BURIALS IN THE INITIAL MASTABA

The finds of human skeletons in the individual rooms and in the area above the burial chamber of the Initial Mastaba (plan 1) were, in the course of the 1968 excavations, labelled with numbers that correspond to the chronological order in which they were found. The letter A preceding the number refers to anthropological finds. It is a continuous series from A 1 to A 46[1].

In most cases it was not a matter of burials of individuals disturbed by grave robbers and quarrymen but entirely mixed-up and scattered material of a large number of individuals. Occasionally isolated bones were found, which had been brought from elsewhere. The majority of bones lay in quite non-anatomical positions and did not mutually fit into the relevant joints. In certains cases (A 36, A 43, A 44, A 46) the bones lay in large piles, giving the impression of having been thrown into the empty spaces of the Mastaba rather than being buried in super-position disturbed by secondary interference. This might be material from graves in the close vicinity of the Mastaba, whose original location is not known, and it has, similarly, not been possible to ascertain the period when the dislocation took place. In the case of some deposits of bones (A 1, A 3, A 20, A 23, A 29, A 36, A 43, A 44, A 46) excavations were carried out by layers[2] in view of the greater thickness. The individual layers were distinguished by numbers added after the number of the burial in the order in which they were uncovered, i. e. from the top downwards.

A 1

Human skeletal remains were discovered in room 25, E of the passage from this room to room 22, at a point where the S wall was disturbed to the core, 60 cm to the E of the NE corner of the passage.

(1) At a depth of 90 cm below the present level of the terrain on a projecting stone block the skull of an adult male lay on the left temple, facing W. Below the skull were blackened remnants of linen and potsherds.

(2) 40 cm lower two child femurs were placed in a niche in the broken wall and beside it an isolated ischium and pubis of a child and a sherd.

(3) 85 cm lower — almost at floor level — tiny fragments of a child's skull vault were found[3]. Closeby lay the infracranial bones of two adults, a male and a female.

A 2

The skeletal remains of at least three children were placed in the SE corner of room 25 — partly in the niche in the disturbed core of the wall. The skull of one of these lay highest on the surface of a sloping stone block, 100 cm below the present level of the terrain. Mixed-up infracranial bones lay to the SE, on the sloping ground between two blocks at a depth 140 cm below the present level of the terrain.

On most of the bones fragile matter survived, probably organic remnants, in places on its surface the structure of the cloth of bandages or shrouds had been preserved. At the SE end of the burial pieces of wood were found, some lying flat, others standing crosswise, probably deriving from the coffin.

A 3

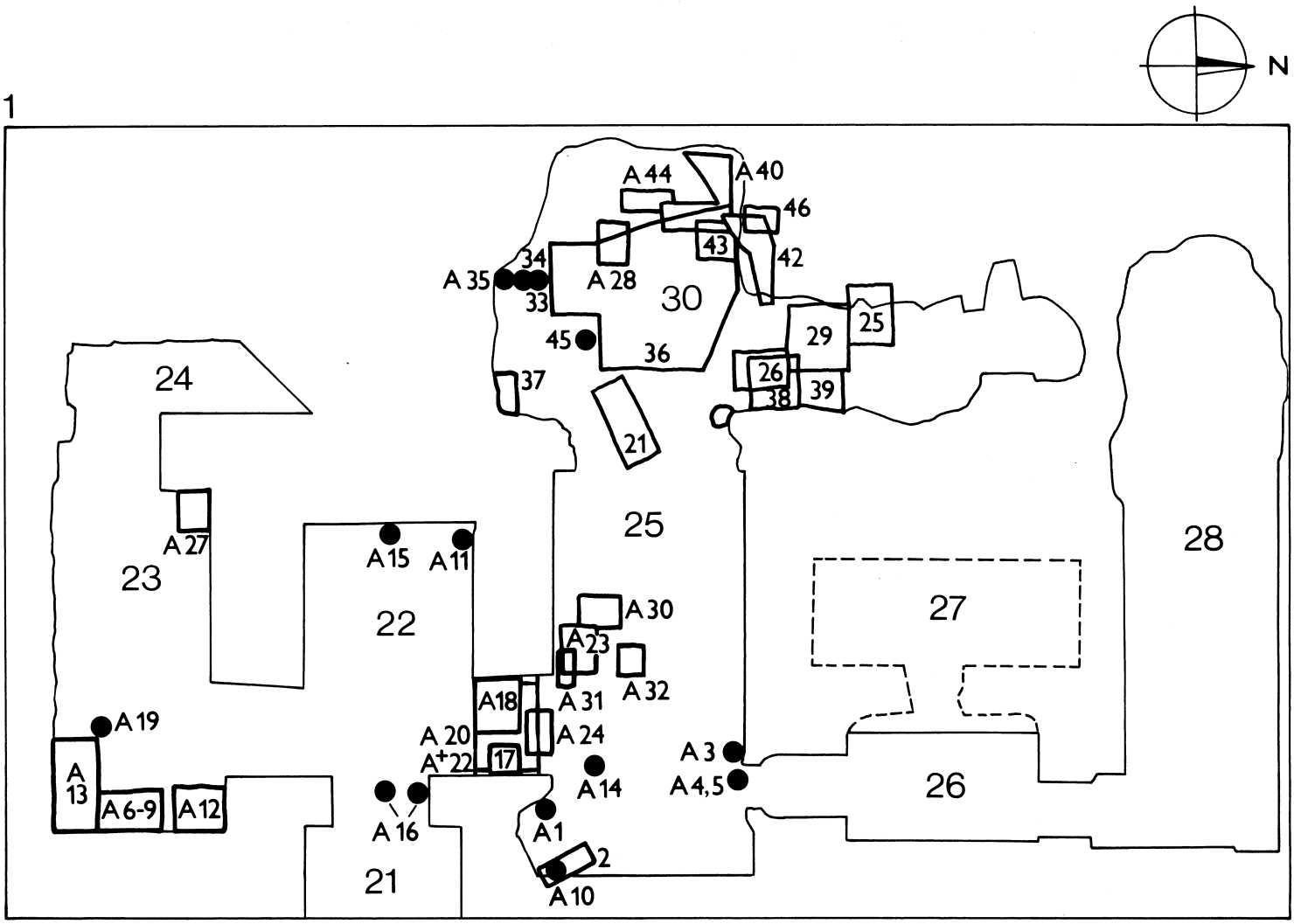
In room 25, about 20 cm W of the SW corner of the entrance from this room to room 26 the remnants of two adults were found where a casing block was missing from the wall.

(1) At the depth of 135 cm below the level of the terrain lay the skull of an adult female, face upwards and the vertex to the S (Pl. 1:1) and E of it the right shoulder-blade. Remnants of brain tissue were preserved in the skull. The mandibles were located 40 cm lower and 100 cm to the SSW of the skull, together with two tibiae of an adult male with remnants of blackened linen on their front parts.

1 The numbers A 47 and A 50 were used to mark skeletal remains dated to the period of the original function of the Mastaba (5th Dynasty, c. 2450 B. C.). They will be published in detail elsewhere. Numbers A 48 and A 49 were given to isolated finds of human bones in the room of the funerary boats (see below sub B).

2 The largest number of layers — a total of thirteen — were distinguished in deposit A 36.

3 In view of the bad state of preservation the find could not be elaborated.



Plan 1. The Initial Mastaba with Single Rooms and Deposits of Human Remains (A 1—A 46)

(2) 55 cm lower further infracranial bones were found — vertebrae, the right radius, right shoulder-blade, and the isolated head of the humerus.

A 4, A 5

In room 25 close to the SW corner of the entrance from this room to room 26 were found skeletal remains of a few children.

(A 4) At the depth of 185 cm below the level of the terrain lay the skull of a child, face upwards and vertex to the NW.

(A 5) Close to the left temple of skull A 4 were found fragments of of parietal bones and the left temporal bone, 20 cm further to the S the frontal bone of the skull of another, younger child.

About 20 cm lower parts of infracranial skeleton were found belonging to the skulls given above as well as to a third, older child. Among them were several further fragments of the skull of child A 5.

A 6—A 9

In room 23, along the E wall, roughly in its two central quarters, lay the remnants of the burials of two adults and several children on an area 130 cm (N—S) by 75 cm (E—W), at a depth of 205 cm below the present level of the terrain.

(6) The skeleton of an adult male had the skull pointing N, the lower extremities S (Pl. 1:2), where it stretched among remnants of the rubble between the core of the wall and the stripped casing. The skull lay on its R side facing W, the infracranial bones were scattered, and it was not possible to reconstruct their original position.

(A 7) Mixed-up infracranial bones of an adult male of smaller size were scattered among the infracranial bones of male A 6.

(A 8) In the S half of burial A 6 were distinguished isolated infracranial bones of a juvenile female.

(A 9) In the NW part of burial A 6 were found scattered little bones of at least three children, from the youngest of whom even fragments of the skull have survived.

Below the occipital condyles of skull A 6 were discovered 4 beads of *ankh* shape and 4 other disc-shaped beads (F 113), by pelvis A 7 a string with 15 blue beads (F 115). Among the infracranial bones of A 6—A 7 lay remnants of linen, fragments of vegetation fibre (probably the remnants of mats), fragments of wood, some of which were shaped into narrow ledges, and fragments of wooden rods. A large number of small beads were scattered among the

bones of the children A 9 (F 116, F 117).

A 10

In room 25, in its SE corner, 40 cm below the burial of the children A 2 and 180 cm below the present level of the terrain the skull of an adult male (Pl. 1:3) was deposited, face down and the R temple to the N, in a niche between the stone block of the core in the E wall and the layer of mortar on the core of the S wall. Its mandible was located 10 cm to the W, base down and the chin to the W. In its vicinity were found 6 vertebrae, the rest of the infracranial skeleton was missing. Inside the skull there survived remnants of the brain, on its surface, part of the hair and bits of linen.

A 11

Fragments of the skull and part of the infracranial skeleton of a child were found just below the floor in the NW corner of room 22.

A 12

In the NE corner of room 23, at a depth of 200 cm below the present level of the terrain, space had been created 100 cm (N—S) by 90 cm (E—W) for the burial of an adult male. To the N it was bordered by remnants of the mortar filling in front of the core of the wall, in the E by blocks of the core of the wall, in the W a little wall had been built of loosely placed stones (l. 100 cm, w. 25—40 cm, h. 40 cm). The wall began at the N wall of the room and ended at the NE corner of a large collapsed block, roughly of rectangular shape, lying in a E—W direction. On the S side the area of the burial was not enclosed.

In this area a completely scattered skeleton was found with the skull dislocated in the NE corner (Pl. 2:1). The skull lay obliquely on the R side of the occiput and the R temporal bone with the face upward and to the NW.

Among the human bones lay scattered animal bones, small wooden rods, fragments of charcoal, a Nile shell (F 167), remnants of three little brushes of halfa (esparto-grass) and strings of vegetation fibres. A faience pendant (F 245) was found not quite 50 cm from this burial.

A 13

In room 23, at the depth of 250 cm below the present level of the terrain and running from the SE corner parallel with the S wall a space had been made 180 cm (E—W) and 80 cm (N—S), bordered to the E and S by the core of the wall and to the W and S by one layer of specially placed stones.

In this limited space were found scattered and mixed-up remnants of at least two adults, one juvenile and one child (Pl. 2:2).

On the S edge of the burial were found animal bones, on the W edge a stone headrest (F 131). Among the bone remnants lay scattered fragments of wood, one of these a larger fragment with remains of polychromy (F 134 A), undoubtedly part of a coffin. Further there were bits of linen, esparto-brushes, small potsherds, more than one hundred small beads (F 134 B) and a miniature rectangular copper plate (F 134 C).

Not quite 100 cm to the W of this burial, at the same level, further beads and amulets in the shape of gods were found (F 135). About 150 cm below the burial, among small stones, 53 beads on an original string (F 152) were discovered, which had probably dropped down after the skeletonisation of the deceased.

A 14

In room 25, 80 cm to the N of the NE corner of the entrance from this room to room 22, were found scattered infracranial bones of an adult male and a child lying on the original limestone floor slabs.

A 15

In room 22, about halfway along the length of the W wall and close to it, at a depth of 250 cm below the present level of the terrain, scattered bone remnants had been deposited. They comprised fragments of two skulls, of an adult and a juvenile male, and some infracranial bones of an adult male and female.

A 16

In the passage from the portico of the Initial Mastaba (room 21) to room 22 the broken mandible of an adult female was found at a depth of 250 cm below the present level of the terrain. One half lay close to the N wall of the passage, the other in about the middle of the passage. Not far from it fragments of a child's skull were discovered, some vertebrae of an adult female and an adolescent and the sacrum of an adult male. These are typical scattered finds ("Streufunde"), lost during manipulation with the bones of some burials in the vicinity long ago.

A 17

In the passage from room 22 to room 25, close to the E wall, about halfway along the passage, at a depth of 250—280 cm below the present level of the terrain, the remains of two children were discovered on an area 65 cm (N—S) by 60 cm (E—W).

Close to the E wall of the passage a skull lay base down and face to the SW and beside it bones from a disintegrated second skull. Around were scattered infracranial bones of two individuals.

By the skull lay a linen bag filled with dark earth, beads, cowry shells and some sherds.

A 18

In the passage from room 22 to room 25 in an area adjacent to the S half of the W wall of the passage, 110 cm (E—W) by 90 cm (N—S) in size, at the same depth as in the case of burial A 17 and at a distance of 20 cm from it, further human skeletal remains were found.

There were scattered and mixed-up infracranial bones of at least three adults (two males and one female) and

two children. A skull base upward and face to the W had been placed among the bones of one of the children. Among the bones of the second of the children in the SW quarter of the burial lay two fragments of its calva. The right femur of one of the adults was dislocated into the area of burial A 17.

By the skull of the first child lay a linen bag (10 by 5 cm) filled with earth, part of a jug, a typical sherd with the plastic face of god Bes (CHARVÁT 1981: 144, 151—2, 156—7, 194, pl. 66) and two beads (E 1068). Scattered fragments of wood from the coffin and other sherds lay among the bones, including some decorated with a blue faience glaze and black geometrical drawing (E 1068) deriving probably from a disturbed layer of the New Kingdom (CHARVÁT 1981: 54, 178, 194, pl. 44)

A 19

In room 23, 200 cm to the W of the E wall and 100 cm to the N of the S wall, 325 cm below the present level of the terrain the mandible of an adult male and some animal bones were found.

A 20

In almost the entire length of the passage from room 22 to room 25, below burials A 17 and A 18 and divided from them by a 30—40 cm thick layer of sand, further human skeletal remains covering an area 190 cm (E—W) by 120 cm (N—S) were discovered at a height of 25—30 cm above the floor slabs (Pl. 2:3).

The infracranial bones of two adult males and parts of the skeletons of at least three children were distinguished. The skull of the oldest of them lay on the R side, facing W, 10 cm to the W of the E wall of the passage, fragments of the skull of the baby to the NE and W of this.

The bones lay partly on remnants of mats of vegetation fibre, and among them lay scattered bits of linen of the wrappings. Two pendants and three tubular beads were found by the skull of the oldest child (E 1133).

A 21

Further deposits of human skeletal remains were discovered on the site of the entirely removed W wall of room 25 and partly in the area above burial chamber 30 on a rectangular area with the longer axis SWW—NEE (160 by 70 cm) at a depth of 220 cm below the present level of the terrain (Pl. 3:1)

These were scattered and mixed-up remains of at least three adults (one male and two females) and no fewer than three children of various ages. The fragments of the skulls of two adults and one child lay roughly in the centre of the deposit, parts of the mandibles and maxillae in the SWW parts. In the E part the bones were a few centimetres lower.

Beads (E 1138) and an amulet (E 1547) were found by the fragment of the child's skull. Two further beads and an amulet (E 1521) lay some 50 cm to the W of the deposit, having probably originally belonged to the burial.

A 22

Directly below burial A 20, some 10—20 cm lower, either directly on the floor slabs or in places that had been broken into, there were further scattered human skeletal remains.

They were the infracranial bones of two adults (male and female) and three children, and in the case of the two babies even fragments of the skulls were preserved.

Among the bones lay a wooden plank (20 by 12 cm) probably from the coffin, some shells and small sherds.

A 23

In room 25 near the NW corner of the entrance from room 22 to room 25 a deposit of bones was discovered below an overhanging block of the core of the wall on a rectangular area 110 cm (W—E) by 70 cm (N—S). It was excavated in three layers.

(1) The upper layer of the deposit, at the height of 85 cm above floor level contained mixed-up bones of two adults, a male and a female. The skull of the male was placed in a niche below the overhanging block of the core of the wall its base with the face to the E (Pl. 3:2).

(2) The middle layer, at a height of 60 cm above the floor, comprised infracranial remains of no fewer than four individuals and one child, among them remains of the skull of an adult female and a child.

An amulet was found among the bones (E 1182).

(3) The lowest layer, at the height of 50 cm above the floor, was made up of scattered bones of the infracranial skeleton of a robust adult male. Some children's bones were mixed up with these, probably from the preceding layer.

In all, the deposit contained the remains of at least 6 adults (4 males and 2 females) and one child.

A 24

In the passage from room 22 to room 25, 40 cm to the W of its NE corner, lay the scattered bones of two small children on area 110 cm (W—E) by 70 cm (N—S). A larger sherd had been placed on the E edge of the burial.

A 25

On the N extension of the disturbed area above burial chamber 30, 140 cm to the E of the W wall of the Mastaba, there began the deposit of human skeletal remains, covering an area 120 cm (E—W) by 80 cm (N—S) and situated 280 cm below the present level of the terrain.

In the deposit were identified the fragments of the skull of an adult male (?) and the infracranial bones of two adults, a male and a female, scattered and mixed up with the calvae of two small children and the infracranial bones of at least four children of different ages.

Two small beads (E 1291), the shell of a snail and sherds were found among the children's bones.

A 26

At the beginning of the extension of the disturbed area above burial chamber 30, 60 cm to the W of the E wall of this extension, a deposit of human skeletal remains was found on an area 100 cm (N—S) by 80 cm (E—W), at a depth of 260 cm below the present level of the terrain.

It was composed of the infracranial bones of two adults, a male and a female, fragments of the skull of a juvenile female and fragments of the skull and the infracranial bones of at least three children.

A 27

In the NW corner of room 23 remains of a burial lay on an area 90 cm (E—W) by 60 cm (N—S).

It comprised the infracranial bones of a juvenile, scattered and incomplete.

Beads threaded on four strings, an incomplete tubular bead and a pendant (F 296) were found among them.

A large number of animals bones, among them those of a crocodile, were found further away from the burial along the N wall of the room towards the E.

A 28

Scattered and mixed-up infracranial remains of an adult female and a child were discovered in the destruction on the W side of the disturbed area above burial chamber 30 on an area 90 cm (E—W) by 55 cm (N—S), at a depth of 140 cm below the present level of the terrain.

Beads (E 1509) lay in groups of two to four among the bones as well as remnants of string and wooden fragments of the coffin.

A 29

In the N extension of the disturbed area above burial chamber 30, between deposits A 25 and A 26, a further deposit of human skeletal remains covered an area 130 cm (E—W) by 120 cm (N—S). It was excavated in three layers.

(1) At a depth of 270—300 cm below the present level of the terrain a scattered skeleton of an adult male and a juvenile were identified. The skull of the adult male lay on its left temple on the W edge of the deposit, the frontal bone of the juvenile in the SW quarter (Pl. 4:1). Sherds and fragments of stone lay among the bones.

(2) 30 cm lower there were the scattered infracranial bones of four further adults and three children. The skull of one of the adult males lay on its base, face to the SE, in the SE quarter of the deposit, the fragments of the skulls of other individuals were scattered among the rest of the bones.

(3) 10 cm lower, on a slighty smaller area 95 cm (E—W) by 120 cm (N—S) lay the incomplete remains of two adults and four children.

A total of 15 individuals were ascertained in the deposit, of these 4 adult males, 3 adult females and at least 8 children of different ages.

A 30

In room 25, 40 cm to the N of its S wall and directly W of deposit A 23, on an area 80 cm (N—S) by 60 cm (E—W) there lay a pile of scattered and mixed-up human remains.

Among the infracranial bones of two adults, a male and a female, the skull of a female was discovered and on the S edge of the pile the skull of male, placed on its back, base towards the SE.

Around the skull were found bits of linen.

A 31

In room 25, at the NW corner of the entrance from this room to room 22 scattered remains of a burial were found on an area 80 cm (E-W) by 35 cm (N—S) at a place where the pavement had been broken.

There were fragments of a skull and several infracranial bones of an adult female and the femur of a juvenile.

A 32

In room 25, about 90 cm further N of burial A 31, some infracranial bones of two adults, a male and a female, were found on an area 60 cm (E—W) by 50 cm (N—S), at floor level. They were typical scattered finds ("Streufunde"), transferred from another place.

A 33—A 35

At the southern edge of the disturbed area above burial chamber 30, in the destroyed core of the wall of the Mastaba, about 50 cm below the present level of the terrain, three skulls were found, placed in a row from N to S.

(A 33) The skull of an adult female, placed at the northernmost point, rested on its base with face turned to the S.

(A 34) About 20 cm to the S, the skull of a juvenile male was placed on its base with face to the S.

(A 35) A further 15 cm to the S lay the remnants of a child's skull crushed by the pressure of the surrounding stone blocks.

These must be intentionally placed skulls from some deposit in the neighbourhood (A 28 or A 36).

A 36

In the disturbed area above burial chamber 30 the largest deposit of human bones found in the Mastaba filled the entire area above the centre of the burial chamber. It covered an area of 360 cm (N—S) by 335 cm (E—W), and its total thickness amounted to more than 200 cm. The lowest layer was placed 310 cm above the floor of the burial chamber and 210 cm above the level of the upper edge of the large sarcophagus of the owner of the Mastaba, Ptahshepses. The space between the floor and the lowest level was filled in with clean, wind-blown desert sand. The top layer of the deposit lay 120 cm above the floor level of adjoining room 25, i. e. cca 280 cm below the present level of the terrain.

The entire area thus set aside was densely filled with completely scattered and mixed-up human bones of an immense number of individuals. On the basis of their age and sex structure it became possible to determine at least 19 adult males, 12 adult females and 38 children, i. e. 69 persons. Several objects of the funerary equipment were found among the bones, but finds of wood from coffins were absent. The bone remains were placed in a funnel-shaped area, which possibly the quarrymen or the grave robbers had broken into the core of the Mastaba and the original roof of the burial chamber. The deposited bone remains, so closely arrayed one above the other and beside the other, did not leave the impression that we were dealing with burials placed one beside the next and in close superposition, which were disturbed by later interference during further quarrying of stones or when the robbers made their way into the burial chamber. It seems more likely that this was a secondary burial of disarticulated bones of burials that had originally been placed in another, unknown place, in all likelihood not far away. This would also explain the absence of remnants of coffins.

Excavation were carried out on a total of 13 layers of 10—20 cm thickness, which were numbered in the order in which they were uncovered, i. e. from the top downwards (plan 2). If we begin in the opposite direction, it is clear that the lowest layers (13—8) bordered the edge of the undisturbed core of the Mastaba on the N side of the disturbed area above burial chamber 30. From the bottom upwards they filled up an increasing area in directions to the S and to the E. The broadest layer was the seventh, forming an oblique extension with a longer NE — SW axis. Above this extension were deposited further layers — 6 to 4 — which extended above the original space by the wall of the core of the Mastaba only slighty (6, 4) or not at all (5), but spread further to the E (6), to the S and E (5) and only to the S (4). The further layer formed two separate areas, one slightly extended to the E (3 A), the other far to the S (3 B). Above the first of these lay the last layer but one (2), while the last, the uppermost, was extended even further to the E and chiefly to the S (1). This overall spread of the area of the bone deposit from the bottom upward in the E and S direction probably corresponded to the funnel shape of the quarried out area above the burial chamber.

Below follows a brief characterization of the individual layers in the order in which they were uncovered with elevation in height in relation to the floor level of the nearest room 25 and with data on their surface area.

(1) + 120 cm, 150 cm (N—S) by 125 cm (E—W). A layer of infracranial bones of a number of adults and juveniles, 5 mandibles and an isolated facial skeleton (Pl. 4:2).

(2) + 110 cm, 120 cm (N—S) by 130 cm (E—W). A layer of scattered infracranial bones and fragments of skulls of a number of adults and juveniles. In the NW quadrant were piles of mixed-up and often broken bones of the lower extremities of one adult from the knees down. Closeby a Nile shell was found.

(3) + 100 cm. The layer comprised two separate areas, of which 3 A was located below the area of layer 2, area 3 B 25 cm further to the S and 65 cm to the W.

(3 A) 95 cm (N—S) by 120 cm (E—W). Scattered infracranial bones and fragments of skulls and mandibles. On the NW edge the skull of a male was placed on its base with the face to the S (Pl. 5:1). An amulet, fragments of a second one and tubular beads (E 2026) were found among the bones.

(3 B) 160 cm (N—S) by 140 cm (E—W). Mainly infracranial bones of a number of individuals, part of which, in the E half, lay in an E—W direction.

(4) + 80 cm, 180 cm (N—S) by 130 cm (E—W). Layer of large size, composed of infracranial bones of a number of individuals and several skulls. One of these was placed on the R temple, face to the NE, a second in inverse position on the back of the head (without face and with remains of the brain), a further two survived in fragments. In the central part of the layer lay part of the legs with remnants of soft tissues without traces of resin or wrappings (Pl. 5:2). Animal bones and small potsherds lay among the human bones.

(5) + 60 cm, 180 cm (E—W) long, in the E third only 40 cm broad, and in the W third about 120 cm (N—S). Among the infracranial bones of a number of individuals was one tibia, placed in a semi-standing oblique position, two mandibles and several animal bones (Pl. 6:1).

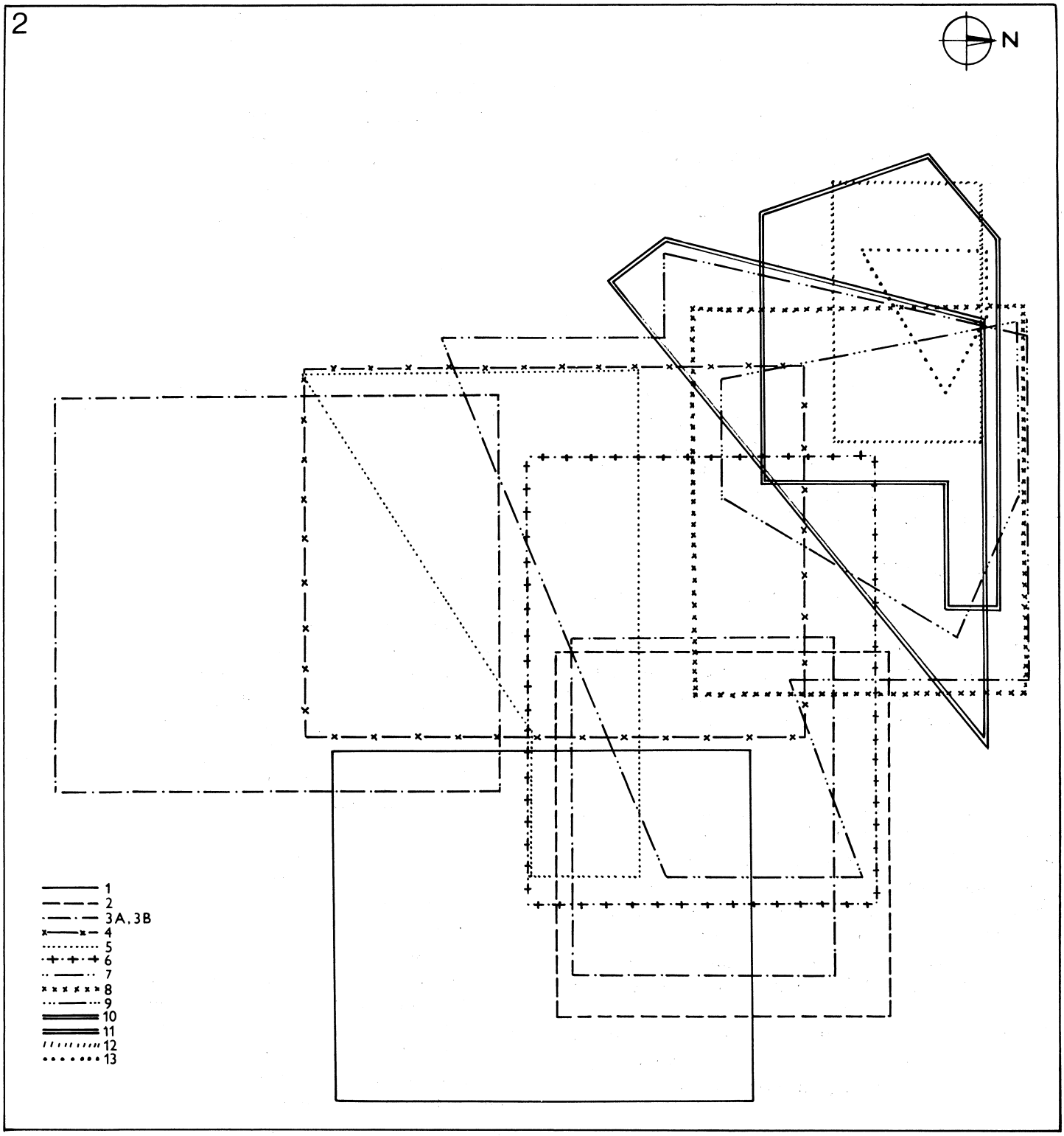
6) + 40 cm, 125 cm (N—S) by 160 cm (E—W). Among the scattered infracranial bones of a number of individuals lay a skull on its R side with the face to the SW, fragments of other skulls and three mandibles.

(7) + 20 cm, irregularly shaped area stretching as much as 210 cm (N—W) by 220 cm (E—W). Thickly piled up infracranial bones of a number of individuals, among them fragments of several skulls and six mandibles (Pl. 6:2). Animal bones were classified among the human bones. Small remnants of the linen of wrappings remained on several bones. On the N edge three beads and an amulet (E 2169) were found and on the E edge a piece of rolled linen.

(8) + 5 to 0 cm, 120 cm (N—S) by 140 cm (E—W). Scattered infracranial bones of adults and children, fragments of skulls and three mandibles (Pl. 7:1). Several long bones (e. g. L humerus and R tibia of an adult) were found in an oblique, almost vertical position. Beads (E 2178) were found by an isolated occipital bone lying some 50 cm to the S of the N edge of the layer.

(9) 0 to -10 cm, 105 cm (N—S) by 105 cm (E—W). In the N part of the layer mainly skulls or their fragments were deposited (Pl. 7:2). Skull **a** (adult female) lay on the R side with the face towards the NE, skull **b** (child) on its base with the face to the S, skull **c** (child) on the back with the face upwards and the base towards the E, skull **d** (child) on the R side with the face to the NE and calva **e** (child) with the top upwards and the forehead to the SE. Some 10 cm away to the E were scattered fragments of skull **f** (small child). Skulls **a, c, d** lay higher and partly covered skulls **b** and **e**. In the S part of the layer there were predominantly scattered infracranial bones of a number of adults and children. Among them, roughly in the middle, an amulet (E 2181) was found.

(10) -20 cm to -30 cm, a long narrow triangle with one of the sides 150 cm (E—W), the second 135 cm (N—W) and the hypotenuse 215 cm (NE—SW). The layer was formed by thickly piled up infracranial bones of a number of children and adults. In the NE corner lay a child's skull on the L



Plan 2. Superposition of the 13 Layers of the Deposit A 36

side, face towards the N (Pl. 7:3).

(11) -40 cm to -50 cm, 85 cm (N—S) by 160 cm (E—W). A pile of infracranial bones of a number of children and adults. Some of the bones lay in a semi-standing oblique position (e. g. the L femur of an adult). Fragments of a child's skull and a pottery vessel (E 2198) were found in the NW of the quadrant. (Pl. 8:1).

(12) -60 cm to -70 cm, 55 cm (N—S) by 90 cm (E—W). The layer was composed of a dense pile of confused infracranial bones of children and adults. In the NW corner the skull of an adult male had been deposited on its base with the face to the SW. On its L parietal bone rested the mandible on its base with the chin to the S. Closeby were fragments of two other children's skulls (Pl. 8:2). In the centre of the N edge of the layer a stopper of Nile mud was found.

(13) -80 cm, 45 cm (N—S) by 50 cm (E—W). A slight pile of several infracranial bones and fragments of a skull. In the S part lay a partly broken vessel (P 4875) containing the remains of a small child (Pl. 8:3).

A 37

In the disturbed core of the wall of the Mastaba on the S edge of the quarried out area above the entrance from burial chamber 30 to the room for the canopic jars 31 a shallow recess was formed to a depth of 250 cm below the present level of the terrain under a projecting wall block, and in it were deposited infracranial bones of four adults and two mandibles of adult males.

A 38

At the E wall of the N extension of the disturbed area above burial chamber 30, at a depth of 300—320 cm below the present level of the terrain, a further deposit of human skeletal remains was discovered on an area 120 cm (E—W) by 100 cm (N—S). The skull of an adult male lay on its L side, face to the SW, in the SW corner. The fragments of several children's skulls were found in the NW and SE corners. Not far from the NE edge of the deposit the left half of a mandible was found. The rest of the area was taken up with infracranial bones of 6 children and 5 adults (Pl. 9:1).

Below the mandible lay an udjat amulet (E 2134), 15 cm to the S of the skull, an amulet in the form of god Bes (E 2126).

About 10 cm lower down, further fragments of skulls and infracranial bones, mainly of children, were scattered over a smaller area, 100 cm (S—N) by 60 cm (E—W). A larger quantity of potsherds was found among them.

A 39

By the E wall of the extension of the disturbed area above burial chamber 30, just N of deposit A 38 lay a smaller pile of infracranial bones of at least 4 children of different ages, two adult males, and an adult female. These were at a depth of 350 cm below the present level of the terrain on an area 80 cm (S—N) by 70 cm (E—W). In its centre lay the skull of an adult female on the L side, face to the S, and by it to the SW, fragments of a child's skull (Pl. 9:2).

To the S of the fragments of the child's skull an udjat amulet (E 2154) and an incomplete amulet in the shape of a schematic human figure (E 2153) were found.

A 40

In the NW corner of the disturbed area above burial chamber 30 a further deposit of human skeletal remains was unearthed near the W edge of the Mastaba at a depth of 350 cm below the present level of the terrain. It was composed of two sections.

(A) The E section was formed by a rectangle 135 cm (S—N) by 70 cm (E—W) filled with the infracranial bones of two adult males, two adult females and at least six children. In the centre, slightly to the W, lay the fragments of a child's skull and mandibles, resting on the base with the chin to the SE (Pl. 9:3).

(B) The W section adjoined the E section by a 15 cm wide isthmus and formed a triangular area with one side 115 cm (E—W), the second 90 cm (N—S) and the hypotenuse 140 cm (NE—SW). In its SW part lay a pelvis in anatomical position turned with the front side down and the ischia to the SW, and not far from it to the SE, the dislocated lumbar and dorsal spine of the same male; SW of the pelvis, the mandible of an adult female was found on its base, chin to the W. The rest of the area was filled with mixed-up infracranial bones of adults and children.

At the W edge of the deposit a roll of densely woven blackened linen (1. 50 cm, th. 7—8 cm) was found; close to the N edge of deposit B lay a larger fragment of wood, most likely from a coffin.

A 41

At the NE corner between the disturbed area above burial chamber 30 and its N extension fragments of a skull and a single infracranial bone of an older child were discovered at the depth of 380 cm below the present level of the terrain on an area 50 cm in ∅.

A 42

A strip with a deposit of human skeletal remains stretched from the NW corner between the disturbed area above burial chamber 30 and its N extension in a W direction. It was composed of three layers.

(1) At the depth of 360—370 cm below the present level of the terrain there was a strip 230 cm long (E—W), only 25 cm wide (N—S) at its E side and broadening to 65 cm (N—S) in a westerly direction. The skull of an adult female was placed at the SWW edge lying on its base, face towards the SE, and to the N of it the remnants of a child's skull were discovered. In the middle of the strip the mandible of an adult female lay on the base, chin towards the SE and that of a child with the chin to the NW. The rest of the area was filled with scattered infracranial bones of a number of adults and juveniles.

In the E part of the deposit a long wooden handle, probably of a box, lay among the bones.

(2) At the depth of 390 cm below the present level of the terrain, below the W half of the preceding layer, a further deposit of infracranial bones of adults and juveniles covered an area 60 cm (E—W) by 50 cm (N—S). In the middle were two mandibles on their bases, with chins to the S, a child's to the SW of an adult's.

(3) At a depth of 420—430 cm below the surface (i. e. 20—30 cm below the floor level of room 25) on a layer of small limestone chips further human bones were ascertained on a strip 110 cm long (NE—SW) and 50 cm broad (NW—SE). In the midst of infracanial bones of adults and juveniles lay the skull of an adult male, on its R side, face to the N, and NW of it, his mandible lying on its base, chin to the S.

This deposit contained remains of at least 5 adults (3 males and 2 females) and 9 children.

A 43

In the disturbed area above burial chamber 30, close to the S of the W half of the preceding deposit A 42, and partly below deposit A 40, divided from it by a 60 cm thick

layer of sterile sand, a further pile of human skeletal remains was discovered. Its W edge was demarcated by large block of white Tura limestone. It was composed of three layers.

(1) At the depth of 410—415 cm below the present level of the terrain (i. e. 10—15 cm below floor level) lay scattered infracranial bones of adults and children on an area 100 cm (N—S) by 85 cm (E—W). An animal skull had been placed along the W edge lying on its base, face to the S.

(2) 10 cm lower, 25 cm below floor level, a further layer of infracranial bones of adults and children covered an area 100 cm (N—S) by 100 cm (E—W). In its centre the mandible of an adult female lay on its base, chin to the NE; another mandible, face upwards and chin to the E, lay along the S edge of the deposit, and N of it fragments of the skull of an adult female.

(3) 20 cm lower, 35 cm below floor level, a further layer of piles of infracranial bones of adults and children covered an area 100 cm (N—S) by 90 cm (E—W). Fragments of the skulls of adults and children were found along its W, S and E edges, among them the calva of an adult male.

An amulet and a piece of strongly corroded copper (E 2337) were found close to the calva.

This deposit contained remains of at least 5 adults (3 males and 2 females) and 8 children.

A 44

In the W section of the disturbed area above burial chamber 30, near the E edge of the large block of Tura limestone mentioned in connection with the preceding deposit, roughly at floor level, a hiding place of skulls was found in a strip 110 cm (N—S) in length and 34—40 cm (E—W) in width (Pl. 10:1).

(1) In the N part of the deposit the skull of a dog on its R side, face to the S, lay among several human infracranial bones. Adjacent to its base were fragments of the skull of adult male **f**. 10 cm to the S of the skull of the dog was the skull of juvenile female **a**, base upwards and face to the NW. To the SW of it, it touched on the skull of adult male **b** placed on its face, base to the NW. Close by it to the SE was the skull of adult male **c** standing on its base, face to the SSE. 25 cm to the SSW of skull **b** an incomplete skull of child **d** lay obliquely on its base and the left temporal bone, face to the S. 5 cm from it to the SE, another child's skull **e** had been placed on its base with the face to the SW. Between skulls **b** and **d** lay the left half of a mandible, chin to the N.

5 cylindrical beads (E 2207 A—E) and an amulet (E 2207 F) were found by the left temple of skull **a.**

(2) 20—30 cm lower, a further layer of infracranial bones of adults and children was discovered. At its W edge skull **d** of an adult male lay face turned to the SE. Close to its left temple on the W was the incomplete skull **b** of an adult female lying on its base and right side with the face to the NW (Pl. 10:2). Further skulls and mandibles, surviving in fragments, were scattered among the bones.

An amulet (E 2517) was found in connection with the deposit.

In this deposit a total of 12 adults (8 males and 4 females) and 15 children were represented.

A 45

In the S section of the disturbed area above burial chamber 30, at a depth of 100 cm below floor level and 200 cm above the level of the upper edge of the large sarcophagus, were found one half of a mandible, a thoracic vertebra and the shoulder-blade of an adult male.

A 46

In the NW corner of the disturbed area above burial chamber 30, beneath the W end of deposit A 42, at a depth of 60 cm below floor level, a further deposit of human skeletal bones was found, made up of two layers.

(1) The upper layer covered an area 85 cm (N—S) by 60 cm (E—W) and comprised almost exclusively infracranial bones of adults and children, in complete disarrangement. Pieces of wood, probably from coffins, were found among the bones.

(2) 10 cm lower down, a nest of 6 skulls had been placed, taking up an equally large area. Skull **a** of an adult male lay on its base, face to the SSE, close to the N edge of the large block of white Tura limestone. About 50 cm N of it was the skull of child **b** resting on its base, face to the NW. The skull of adult male **c** rested with its temples against the E edge of the limestone block; it lay on its R temple, face to the S. Close by it to the NE was the skull of adult male **d** placed with its base upwards, face to the SSE. 10 cm to the NW of skull **a**, the skull of child **e** lay on its R temple, face to the E. On the W side of skull **a** was the skull of adult male (?) **f**, face down and the R temple to the SW. Further infracranial bones and fragments of the skull of another adult male (?) and 3 children were strewn among the skulls.

An amulet (E 2698) was found in connection with skull **f**. Five futher amulets (E 2704) were additionally found 20 cm E of the deposit.

B) BURIALS IN THE SPACE FOR FUNERARY BOATS

A 48, A 49

During excavations — carried out on 9-10 July 1968 — of space H, set aside originally, to judge by the curving shape of the walls, to house funerary boats, two fragmentary skulls were found. Skull A 48 of a juvenile female was discovered in square E 7, skull A 49 of an adult female in square Z 10 together with the fifth cervical vertebra. The position of the finds is marked on the second survey-plan of the Mastaba (p. 12). Closer data on the finds were not recorded during the excavations.

C) BURIALS IN THE AREA OF THE SOUTH—EASTERN STORE—ROOMS

The remains of ritually deposited burials and isolated finds of human skeletal remains came from excavations of the SE store-rooms in 1966. Their numbering was carried out as part of the rest of the finds so that they do not form a continuous numerical sequence. The letter D refers to the area of the SE store-rooms (plan 3).

Four other burials, marked likewise with the letter D, lay outside the Mastaba and are described at the end of chapter 2.

D 84

At the E edge of the semi-collapsed wall between room 15 and the space for funerary boats 40, isolated parts of a skull were found as well as one metatarsus of an adult together with an animal tooth.

D 123

In room 17, symmetrically in its longer axis (E—W), the skeleton of an adult male without skull rested in ritual posture (Pl. 11:1). It lay on its back in a stretched position, the right hand in its lap and the L arm loosely along the body, head end to the W. The record of the find does not include the level of the burial. It lay above a lower burial D 130 and was divided from it by a layer of sterile sand.

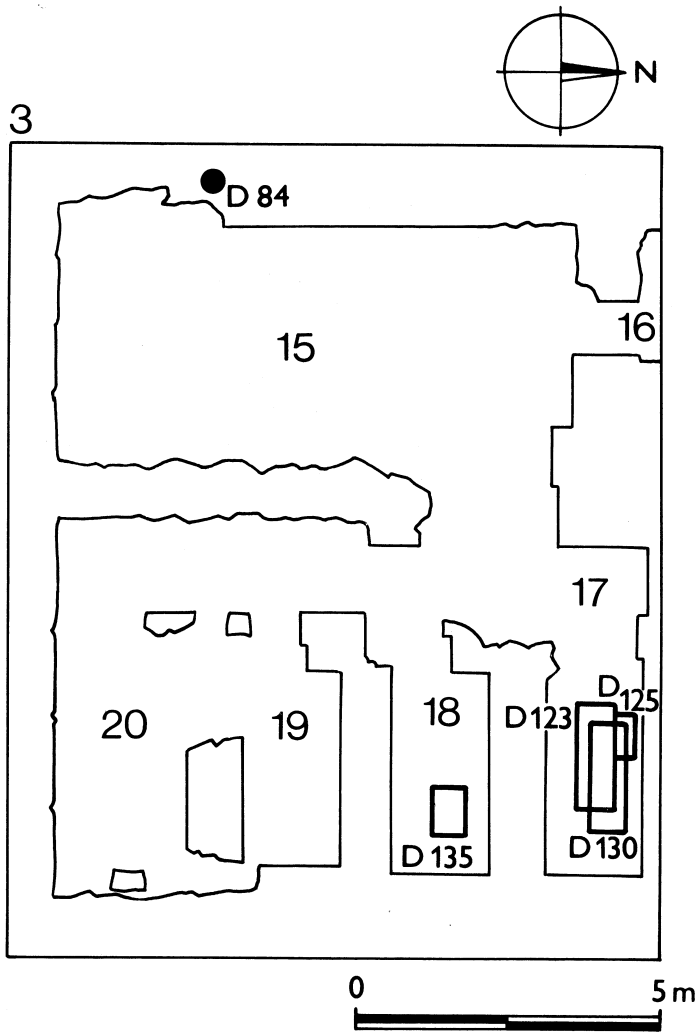
Remnants of linen were found under the left foot.

D 125

In the NW quadrant of room 17, at the level of the chest of the preceding burial, lay the left clavicle, left humerus, left tibia and right fibula, several vertebrae and the mandible of an adult female. The bones were mixed up and several twigs of durra were found among them.

D 130

In room 17, below burial 123, slighty more to the E and N, an almost complete skeleton of adult male **a** (Pl. 11:2) lay on a thin layer of sand above the original floor; there was no skull but a mandible and several isolated upper teeth. It rested in stretched position on its back, both hands in the lap, the head oriented to the W. The right leg was stretched, the left slightly bent and placed over the right one at the knee and the upper part of the shank.



Plan 3. The South-eastern Store Rooms with Five Burials (D 84—D 135)

Parallel with the skeleton of the adult and in the same position was the burial of child **b**. On the original site remained only legs and feet, the rest of the skeleton was mixed up and moved to the W. The skull and upper limbs were absent (Pl. 11:2).

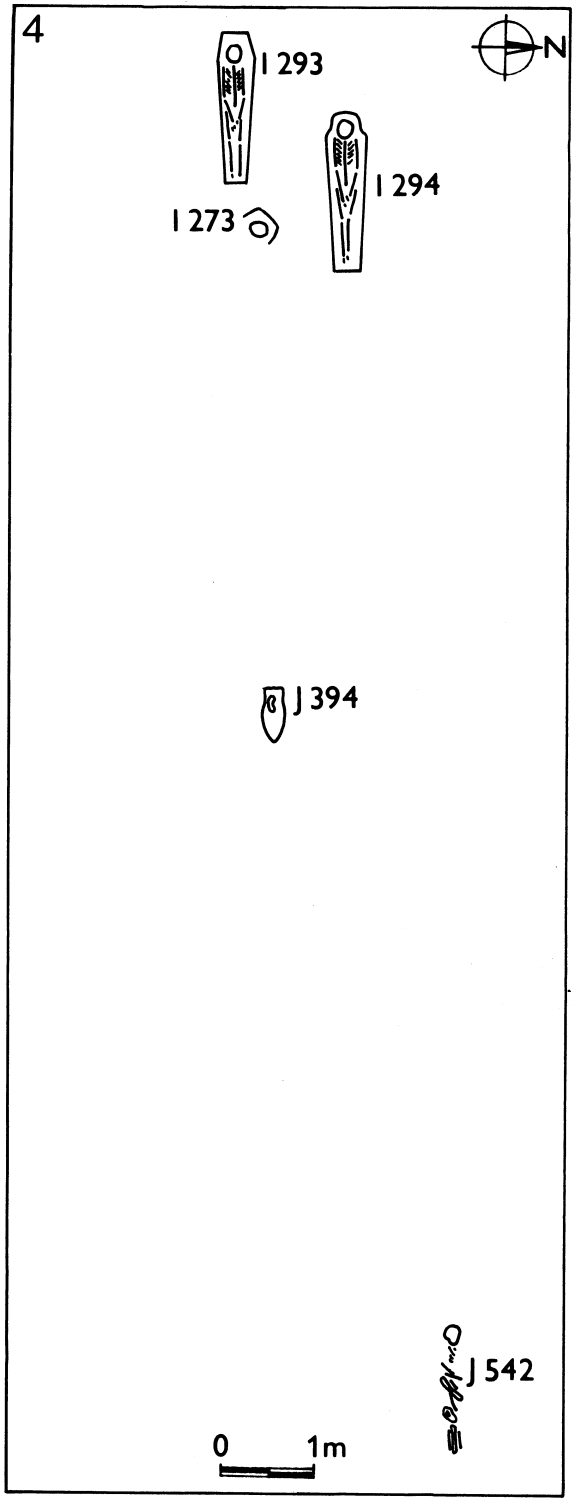
D 135

In the E half of the adjacent room 18 parts of an almost complete, but greatly damaged and mixed-up skeleton of an adult female were found, including remnants of the skull. Animal bones were mixed among this disturbed burial.

CATALOGUE OF BURIALS AROUND THE MASTABA

The catalogue provides only basic data. Coffins will be dealt with in the following chapter, demographic data are given in greater detail in chapter 7. The data on "level" indicate the height above the foundation blocks under the outer walls of the Mastaba, "length" gives the dimension of the skeleton. "Orientation" is given from head to feet.

1. **I 273** (plan 4)
   Burial in a wooden coffin. Placed in a layer of sand with small limestone chips.
   Level: 0.9 m
   Length: 1.55 m
   Orientation: NWW – SEE
   Skeleton of an adult female stretched out on her back. When the skeleton was lifted, it disintegrated with the exception of the skull and the right humerus.
   Finds: amulet in the shape of god Bes,
   9 udjat amulets.
2. **I 287** (plan 5) (Pl. 12:1)
   Burial in a wooden coffin. Placed in a layer of sand with small limestone chips.
   Level: 1 m
   Length: 1.50 m
   Orientation: SWW – NEE
   Skeleton of an adult female stretched out on her back, hands in the lap.
3. **I 293** (plan 4)
   Burial in a wooden coffin. Placed in a layer of sand with small limestone chips.
   Level: 0.1 m
   Length: 1.65 m
   Orientation: W–E
   Skeleton of an adult male stretched out on his back, hands in the lap.
4. **I 294** (plan 4)
   Burial in a wooden coffin. Placed in a layer of sand with small limestone chips and mudbricks.
   Level: 1 m
   Length: 1.60 m
   Orientation: W–E
   Skeleton of an adult female (I 294/1). In addition, skull of an adult male from a disturbed burial in the vicinity (I 294/2).
5. **I 304** (plan 5)
   Burial in a wooden coffin. Placed in a pit in the mudbrick enclosure wall.
   Level: 1 m
   Length: 1.60 m
   Orientation: S–N
   Skeleton of an adult male stretched out on his back. Crushed skull.
6. **I 305** (plan 5) (Pl. 12:2)
   Burial on a board. Placed in a pit in the mudbrick enclosure wall.
   Level: 0.75 m
   Length: 0.75 m
   Orientation: SWW – NEE
   Skeleton of a child stretched out on its back, hands in the lap.
   Finds: Around the neck, 53 small beads (simplified udjat), tubular beads,
   on the right wrist, a copper bracelet,
   on the left wrist, remnants of a copper bracelet,
   by the skull, fragments of copper ear-rings,
   around the ankle of the right and the left leg, strings of a total of 14 cowry shells,
   in the lap, an iron ring.
7. **I 313** (plan 5)
   Burial on a board. Placed in a pit in the mudbrick enclosure wall.
   Level: ±0
   Length: 1.60 m
   Orientation: W–E
   Skeleton of a child stretched out on its back, hands in the lap. Very fragile bones, crushed skull.
   Finds: tubular beads,
   udjat amulet,
   shell,
   two copper rings.
8. **I 316** (plan 5) (Pl. 12:3)
   Skeleton burial. Placed in a cultural layer (ash, sherds, sand) on pavement blocks in the NW corner of the area enclosed by the mudbrick wall of the Mastaba.
   Level: ± 0
   Length: 0.60 m
   Orientation: S–N
   Skeleton of a contracted child on right side, face to the E. Crushed skull, fragile bones.
9. **I 317** (plan 5) (Pl. 12:3)
   Burial in a clay coffin. Placed in a pit in the mudbrick enclosure wall.



Plan 4. Outside the Mastaba — N Part with Five Burials (I 273—I 294, J 394, J 542)

Level: ± 0
Length: 1.80 m
Orientation: W—E
Skeleton of an adult male, stretched out on his back, hands in the lap. Fragile bones.

10. **I 323** (plan 5) (Pl. 13:1)
Skeleton burial. Placed in a pit in the mudbrick enclosure wall (depth of the pit 0.3 m below the top of the wall, width 0.73 m).
Level: ± 0
Length: 1.60 m
Orientation: W—E
Skeleton of a juvenile male, stretched out on his back, hands in the lap.

11. **I 324** (plan 5) (Pl. 13:2)
Burial on a board. Placed in a pit in the mudbrick enclosure wall, (the same pit as I 323, 0.2 m lower down).
Level: -0.2 m
Length: 1.50 m
Orientation: W—E
Skeleton of an adult female stretched out on her back, arms alongside the body.

12. **I 325** (plan 5)
Skeleton burial. Placed in a pit in the mudbrick enclosure wall (depth of pit 0.35 m below the top of the wall).
Level: ± 0
Length: 0.90 m
Orientation: SW—NE
Skeleton of a child stretched out on its back, arms alongside the body.

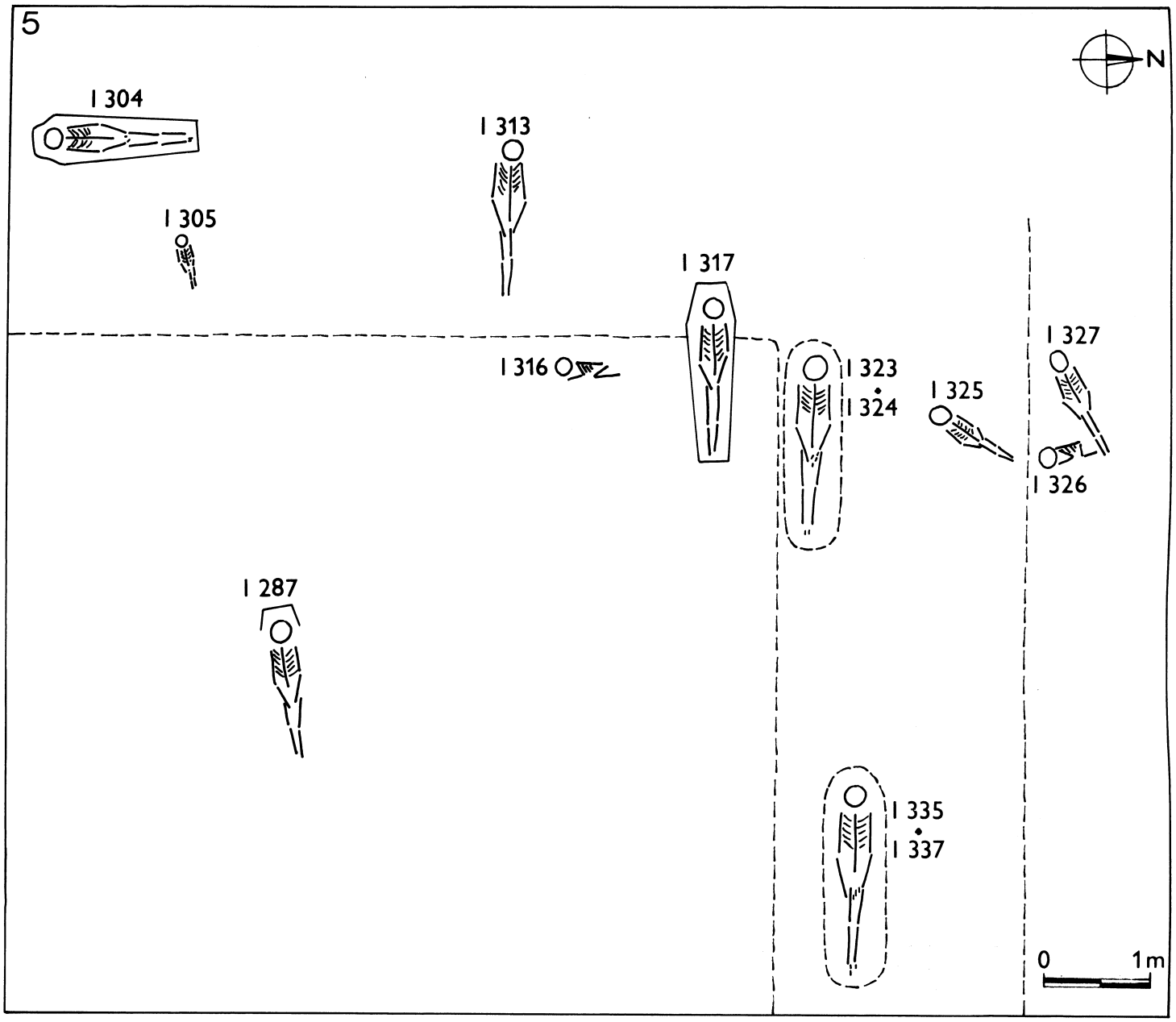
13. **I 326** (plan 5)
Skeleton burial. Placed in a layer of sand with the head close to the mudbrick wall.
Level: ± 0
Length: 0.90 m
Orientation: S—N
Skeleton of a contracted child on left side, face to the W.

14. **I 327** (plan 5)
Skeleton burial. Placed in a layer of sand close to the mudbrick wall.
Level: ± 0
Length: 0.75 m
Orientation: SW—NE
Skeleton of a child stretched out on its back. Fragile bones, disintegrated immediately.
Finds: copper ring, probably bracelet.

15. **I 335** (plan 5)
Burial on a board. Placed in a pit in the mudbrick enclosure wall.
Level: ± 0
Length: 1.1 m
Orientation: W—E
Skeleton of an adult female stretched out on her back, hands in the lap. Defective bones, missing from the knees downwards.

16. **I 337** (plan 5)
Burial in a wooden coffin. Placed in the same pit as burial I 335 (c. 0.15 m lower down).
Level: -0.15 m
Length: 1.65 m
Orientation: W—E
Skeleton of an adult male stretched out on his back, hands in the lap. Skull turned to the left.

17. **I 374/1** (plan 6)
Burial in a pottery storage jar (CHARVÁT 1981, pp. 130, 159, 161, pl. 16). Placed in a niche at the top of the mudbrick wall.
Level: 3 m



Plan 5. Outside the Mastaba — NW Part with Thirteen Burials (I 287—I 337)

Orientation: Jar with the mouth to the W.
Burial of a child placed with the head at the mouth of the jar.

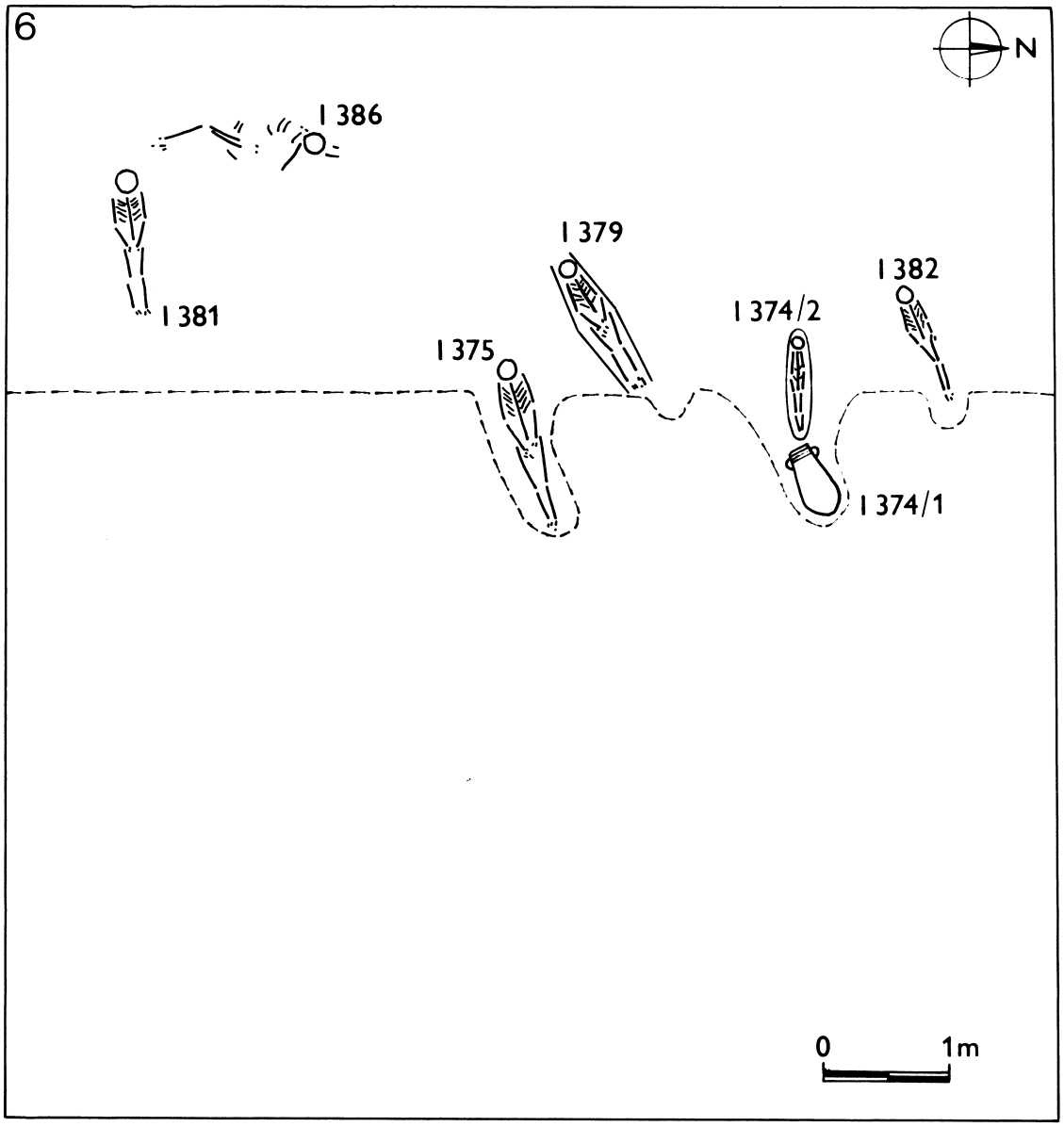
18. I 374/2 (plan 6)
Skeleton burial. Placed in wind-blown sand to the west of the mudbrick enclosure wall.
Level: 3 m
Length: 0.88 m
Orientation: W—E
Skeleton of a child, stretched out on its back, hands in the lap. Crushed skull and thorax.
Finds: necklace of shells around the neck.

19. I 375 (plan 6)
Burial on a board. Placed in a niche in the mudbrick enclosure wall.
Level: 3 m
Length: 1.69 m
Orientation: W—E (ca. 260°)
Skeleton of an adult male stretched out on his back, hands in the lap. Crushed thorax.

20. I 379 (plan 6)
Burial in a wooden coffin. Placed in wind-blown sand, the feet touching the mudbrick enclosure wall.
Level: 2.8 m
Length: 1.15 m
Orientation: SW—NE (c. 245°)
Skeleton of a child stretched out on its back, hands in the lap. Crushed thorax.

21. I 380 (plan 7)
Burial in a wooden coffin. Placed in wind-blown sand west of the mudbrick enclosure wall, the head of the coffin lay about 0.2 m higher than the bottom end.
Level: 2.8 m
Length: 1.40 m
Orientation: W—E (c. 260°)
Skeleton of an adult female stretched out on her back. A scattered child's skeleton I 380/2 was found on the remnants of the coffin.

22. I 381 (plan 6)
Skeleton burial. Placed in wind-blown sand. An



Plan 6. Outside the Mastaba — SW Part with Seven Burials (I 374—I 386)

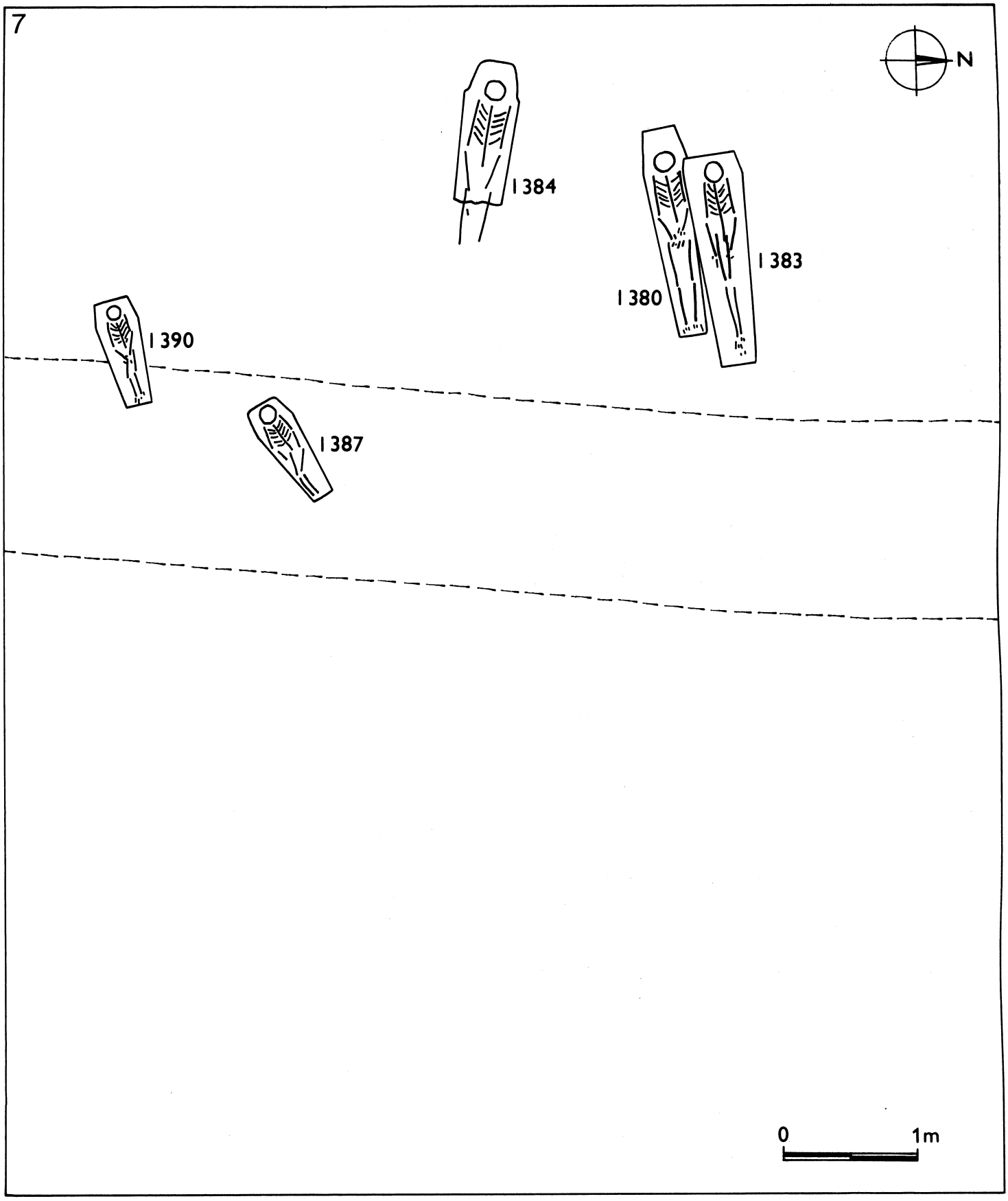
unhewn fragment of a limestone block (l. 0.5 m, w. 0.15 m, h. max. 0.28 m) was placed alongside the left side of the burial and parallel with it, perhaps to strengthen the burial pit.
Level: 2.8 m
Length: 0.58 m (surviving part from head to pelvis)
Orientation: W—E (c. 250°)
Skeleton of a child stretched out on its back, hands in the lap. The bones of the lower limbs have not survived.

23. I 382 (plan 6) (Pl. 13:3)
Skeleton burial. The lower limbs partly placed in a niche at the top of the mudbrick enclosure wall.
Level: 2.8 m
Length: 1 m
Orientation: W—E (c. 260°)
Burial of a child (I 392/1) stretched out on its back, hands in the lap. The right lower limb bent in such a manner that the right knee lay over the left one. No bones of the feet. Further, the skull of an adult female (I 382/2), probably from a disturbed burial in the vicinity.

24. I 383 (plan 7)
Burial in a wooden coffin. Placed in wind-blown sand, partly in superposition to burial I 380.
Level: 2.9 m
Length: 1.50 m
Orientation: W—E (c. 260°)
Skeleton of an adult female stretched out on her back.

25. I 384 (plan 7)
Burial in a wooden coffin. Placed in wind-blown sand.
Level: 3 m
Length: 1.50 m (surviving part down to the ankles)
Orientation: W—E (c. 285°)
Skeleton of an adult female stretched out on her back, hands in the lap. The feet of the skeleton are missing.

26. I 386 (plan 6) (Pl. 14:1)
Skeleton burial. Placed in sand with small limestone chips.
Level: 4.1 m
Length: 1.55 m
Orientation: N—S
Skeletal remains of an adult male entirely scattered, incomplete skeleton.



Plan 7. Outside the Mastaba — SW Part with Five Burials (I 380—I 390)

27. I 387 (plan 7) (Pl. 14:2)
Burial in a wooden coffin. Placed in wind-blown sand above the mudbrick destruction.
Level: 3.5 m
Length: 0.75 m
Orientation: SW—NE (c. 230°)
Skeleton of a child stretched out on its back, lower limbs bent to the right.
Finds: On the right wrist a bracelet of iron wire,
on the left wrist a bracelet of copper and a second one of iron,
by the left temple a copper ear-ring,

a jar to the left of the skull (CHARVÁT 1981, pp. 132, 156–7, pl. 9).

28. I 390 (plan 7)
Burial in a wooden coffin. Placed in a layer of sand with small limestone chips.
Level: 3.5 m
Length: 0.75 m
Orientation: W–E (c. 255°)
Skeleton of a child stretched out on its back, hands in the lap.
Finds: scattered shells in the coffin.

29. I 393 (plan 8) (Pl. 14–3)
Burial in a wooden coffin. Placed in the mudbrick destruction. The burial pit penetrates the layer of wind-blown sand and reached as far as the lower layer of the disintegrated bricks.
Level: 3.5 m
Length: 1.60 m
Orientation: W–E
Skeleton of an adult male stretched out on his back, hands in the lap. Skull half turned to the left.

30. I 395 (plan 8)
Burial in a wooden coffin. Placed in the layer of the mudbrick destruction. The head of the coffin was fitted among a fragment of a limestone concave cornice and a pyramidion of a red granite obelisque leaning against each other (VERNER 1976 b, p. 111, pl. 10 A).
Level: 4 m
Length: 1.80 m
Orientation: NW–SE (c. 310°)
Skeleton of an adult male stretched out on his back, hands in the lap.

31. I 397 (plan 8)
Skeleton burial. Placed in the mudbrick destruction.
Level: 4 m
Length: 0.85 m
Orientation: NW–SE (c. 305°)
Skeleton of a child stretched out on its back, hands in the lap. Four plant stalks (∅ 3–4 cm) were placed lengthwise under the skeleton.

32. I 400 (plan 8)
Secondary skeleton burial placed in the rubble of the burial chamber of the mudbrick twin-mastaba added to the northern wall of the Mastaba of Tepemankh.
Level: 2.9 m
Length: 1.2 m
Orientation: S–N
Skeleton of a child stretched out on its back.
Finds: A flat oval-shaped amulet in the form of god Bes lay in the sand filling of the burial chamber.

33. I 401 (plan 8)
Burial in a wooden coffin. Placed in the layer of mudbrick destruction.
Level: 3.5 m
Length: 1.55 m
Orientation: W–E (c. 285°)
Skeleton of an adult female, stretched out on her back, hands in the lap. Crushed facial part of the skull.

34. I 403 (plan 8) (Pl. 15:1)
Burial in a wooden coffin. Placed in the layer of mudbrick destruction.
Level: 3.5 m
Length: 1.65 m
Orientation: W–E (c. 285°)
Skeleton of a child stretched out on its back, hands in the lap. Skull turned to the left.

35. I 405 (plan 8) (Pl. 15:2)
Burial in a wooden coffin. Placed in a layer of sand with small limestone chips.
Level: 3.5 m
Length: 1.74 m
Orientation: NW–SE (c. 300°)
Skeleton of a juvenile female stretched out on her back, hands in the lap. Skull turned to the left, the right side of the skull crushed. Below the skull, remnants of dark hair.
Finds: around the neck, a necklace of corroded silver and agate pearls, linked with a corroded silver medallion and a pendant in the shape of a sphere, with a conical base,
on the forearm of the right side, a copper wire bracelet, around which remnants of linen survived,
on the fingers of the right and the left hand, one ring each, made of corroded silver,
behind the right temporal bone on the skull, visible traces of ear-rings destroyed by corrosion.
In the sand approx. 1 m from the coffin, an empty vessel was found (CHARVÁT 1981, pp. 136, 151–2, 156–7, 178–9, 196, 198 and pl. 8).

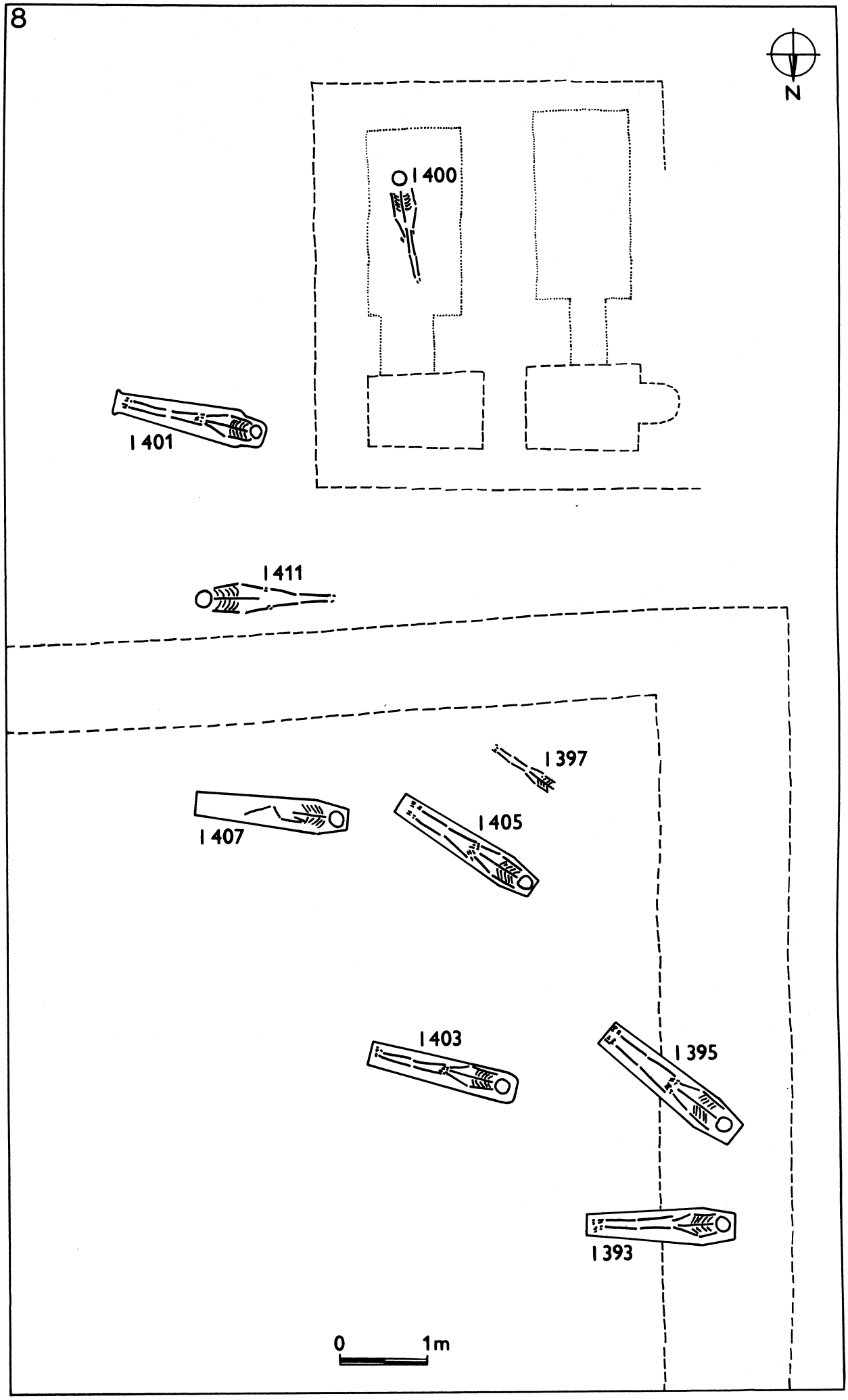
36. I 406 (plan 9)
Burial in a wooden coffin. Placed in wind-blown sand.
Level: 3.5 m
Length: 1.70 m
Orientation: W–E (c. 265°)
Skeleton of an adult female stretched out on her back, hands in the lap. Remains of hair, dark brown in colour, survived on the skull.

37. I 407 (plan 8) (Pl. 15:3)
Burial in a wooden coffin. Placed in a layer of sand with small limestone chips.
Level: 3.9 m
Length: 1.20 m (the skeleton of the lower limbs from the knees downwards is missing)
Orientation: W–E
Skeleton of a juvenile male (I 407/1) mixed-up in a coffin. The thorax turned with the spine upwards, the right lower limb twisted in the hip joint in the direction of the skull, the bones of the hand below the skull, the bones of the arm pushed inside the thorax. Two wooden sticks (∅ 3–4 cm)[4] pass through the thorax. In addition, the skeleton of an adult male from some disturbed burial in the vicinity (I 407/2).

38. I 411 (plan 8)
Skeleton burial. Placed in a layer of sand with small limestone chips.

4 It might have been a case of cutting up the dead body and its fixation with the aid of sticks for fear of return (vampirism).

Plan 8. Outside the Mastaba – SW Part with Nine Burials (I 393–I 411) →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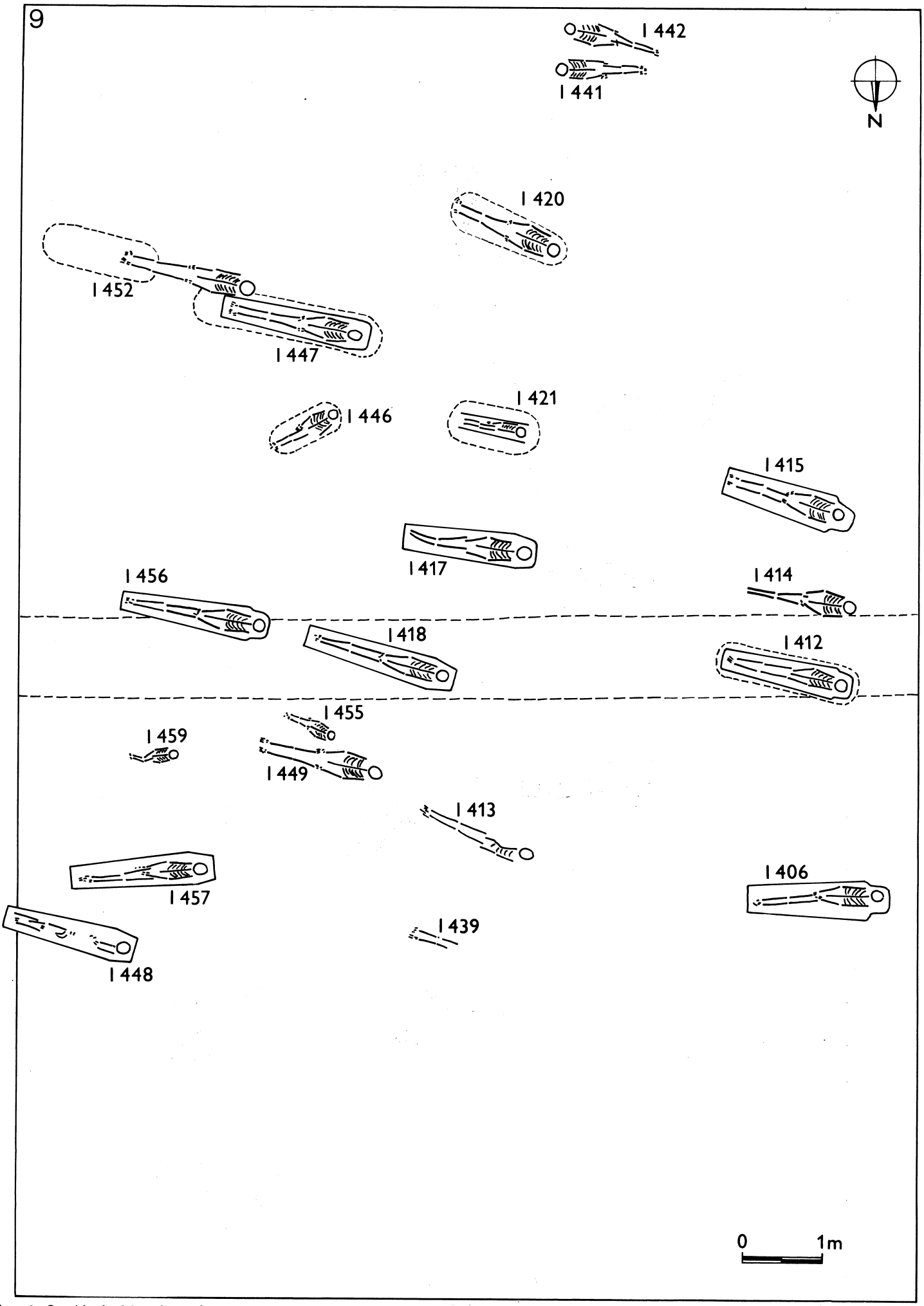


Plan 9. Outside the Mastaba — S Part with Twenty—One Burials (I 406—I 459)

Level: 4 m
Length: 1.60 m
Orientation: E—W
Skeleton of an adult male stretched out on his back, hands on the femora. The small bones of the feet have not survived. Fragments of linen remain on the skeleton, visible, in particular, on the neck and between the femora.
Finds: On the skeleton, a fragment of a tubular bead.

39. **I 412** (plan 9)
Burial in a wooden coffin. Placed in a layer of mudbrick destruction, the grave pit covered with an unbroken layer of trampled clay with limestone chips (probably remains of a destruction plateau).
Level: 3.4 m
Length: 1.55 m
Orientation: W—E (c. 285°)
Skeleton of an adult female stretched out on her back, hands in the lap.

40. **I 413** (plan 9)
Burial placed in the sand on wooden poles c. 1 cm in ∅.
Level: 3.9 m
Length: 1.40 m
Orientation: W—E (c. 285°)
Skeleton of a child stratched out on its back, shoulders turned to the left side, arms alongside the body. Crushed skull.
Finds: On the skeleton, a faience bead.

41. **I 414** (plan 9) (Pl. 16:1)
Skeleton burial. Placed in a layer of sand with small limestone chips, the grave pit covered with an unbroken layer of trampled down clay and limestone chips (probably remains of a destruction plateau).
Level: 3.9 m
Length: 1.40 m (without skull and leg)
Orientation: W—E (c. 280°)
Skeleton of an adult male stretched out on his back, hands in the lap, the lower limbs crossed (the right leg over the left). Crushed skull, the small bones of the feet do not survive. Remnants of linen found on the skeleton.

42. **I 415** (plan 9) (Pl. 16:2)
Burial in a wooden coffin. Placed in a layer of windblown sand. The outline of the grave pit survives on the profile (depth 0.62 m, width max. 0.62 m).
Level: 3.5 m
Length: 1.55 m
Orientation: W—E (c. 285°)
Skeleton of an adult male stretched out on his back, hands in the lap, skull half-turned to the right.
Find: Fragment of a concave stone slab.

43. **I 417** (plan 9) (Pl. 16:3)
Burial in a wooden coffin. Placed in a layer of sand with limestone chips and potsherds. The grave pit partly covered by a destruction plateau of trampled limestone dust and chips.
Level: 3.3 m
Length: 1.55 m
Orientation: W—E (c. 280°)
Skeleton of a child stretched out on its back, slightly twisted to the left, the skull turned to the left shoulder. The left arm alongside the body, the right one, in the lap. The lower right limb slightly bent to the left.

44. **I 418** (plan 9)
Burial in a wooden coffin. Placed in a layer of sand with small limestone chips. The outline of the grave pit survived on the profile (depth 0.52 m, width max. 0.51 m). Filled in with darker sand mixed with clay.
Level: 3.3 m
Length: 1.63 m
Orientation: W—E (c. 285°)
Skeleton of an adult male stretched out on his back, the right arm alongside the body, the left arm bent at the elbow so that the humerus lay alongside the body and the hand in the lap.

45. **I 420** (plan 9)
Skeleton burial on a board. Placed in a pit in the brick plateau covering a layer of clay and potsherds. Depth of pit 0.7 m, filled in with sand.
Level: 3.5 m
Length: 1.40 m
Orientation: W—E (c. 290°)
Skeleton of a child stretched out on its back, hands in the lap.

46. **I 421** (plan 9)
Burial in a wooden coffin. Placed in a pit in the brick plateau covering a layer of clay and potsherds (length of pit 1.15 m, width max. 0.55 m). The filling of the grave pit consists of sand mixed with limestone chips, clearly derived from a destruction plateau lying only a few cm above the layer of mudbricks. Depth of the grave pit 0.45 m to the lid of the coffin.
Level: 3.5 m
Length: 0.8 m
Orientation: W—E (280°)
Skeleton of a child stretched out on its back, crushed skull, the lower mandible dislocated between the thorax and the pelvis.

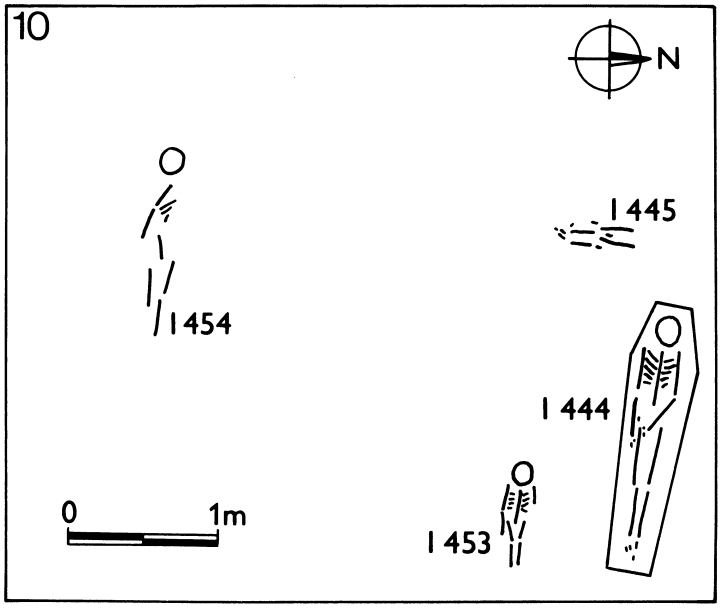
47. **I 439** (plan 9)
Incomplete skeleton burial. Placed in a layer of sand mixed with clay and limestone chips. Secondary disturbance by a dry stone wall[5].
Level: 2.5
Length: 0.6 m
Orientation: W—E (c. 295°)
Remnants of the skeleton of a child stretched out on its back, of which there survives in full only the skeleton of the lower right limb and part of the lower left limb to the middle of the femur.

48. **I 441** (plan 9)
Skeleton burial. Placed in a layer of clay of mudbrick destruction, the pit was filled in with sand.
Level: 4.5 m
Length: 1.10 m
Orientation: E—W
Skeleton of a child stretched out on its back, arms

5 This little wall is likely to have served to hold the sand during the destruction of the outer facing of the Mastaba on its southern wall.

alongside the body, the skull turned to the left. Remnants of linen survive on the bones (on the vertebrae, pelvis, soles).
Finds: Bellow the burial, a fragment of a strongly corroded copper ring was found.

49. I 442 (plan 9)
Skeleton burial. Placed in a layer of clay of mudbrick destruction, the grave pit filled in with sand.
Level: 4.5 m
Length: 1.15 m
Orientation: E—W (c. 105°)
Burial of a child stretched out on its back, hands placed on the femora. Remnants of linen survive on the bones.



Plan 10. Outside the Mastaba — S Part with Four Burials (I 444—I 454)

50. I 444 (plan 10)
Burial in a wooden coffin. Placed in a layer of disintegrated mudbrick and potsherds, close to the northern face of a mudbrick wall.
Level: 4.1 m
Length: 1.65 m
Orientation: W—E (c. 275°)
Skeleton of an adult male stretched out on his back, the left hand in the lap, the right one on the femur.
Finds: By the toes of the right foot a thin copper ring was found.

51. I 445 (plan 10)
Remains of a skeleton burial placed in an extension of mudbricks E of the NE corner of the Tepemankh Mastaba.
Level: 4.1 m
Length: 0.9 m (existing part)
Orientation: N—S
Only the lower limbs have survived of a skeleton of an adult female (?).

52. I 446 (plan 9)
Skeleton burial. Placed in a pit in the mudbrick plateau covering a layer of clay and potsherds.
Level: 3.4 m
Length: 0.85 m
Orientation: W—E (c. 255°)
Skeleton of a child stretched out on its back, the right arm alongside the body, the left arm bent at the elbow lying on the chest. The skull turned towards the left shoulder.

53. I 447 (plan 9)
Burial in a wooden coffin. Placed in a pit (l. 2.37 m) in the mudbrick plateau covering a layer of clay and potsherds. Filling made of the same material.
Level: 3.4 m
Length: 1.70 m
Orientation: W—E (c. 280°)
Skeleton of an adult female stretched out on her back, hands in the lap. Skull turned to the left.

54. I 448 (plan 9)
Burial in a wooden coffin. Placed in a layer of windblown sand between the southern wall of the Mastaba and the enclosure wall.
Level: 3.5 m
Length: 1.50 m
Orientation: W—E (c. 285°)
Skeleton of an adult female. The bone remains were mixed up in the coffin.

55. I 449 (plan 9)
Skeleton burial. Placed in sand coloured by clay of the mudbrick destruction.
Level: 3.4 m
Length: 1.55 m
Orientation: W—E (c. 280°)
Skeleton of an adult male stretched out on his back, hands in the lap. Crushed facial part of the skull. Remnants of linen adhered to the bones.

56. I 452 (plan 9) (Pl. 17:1)
Skeleton burial. Placed in a pit (l. 1.4 m, w. max. 0.6 m, d. 1.3 m) in the mudbrick plateau covering the layer of clay and potsherds, with the head in a niche of the western wall of the burial pit.
Level: 3.2 m
Length: 1.7 m
Orientation: W—E (c. 280°)
Skeleton of an adult male stretched out on his back, hands on the femora. Skull turned to the right. Fragments of linen adhered to the bones.

57. I 453 (plan 10) (Pl. 17:2)
Skeleton burial. Placed at the level of the extension of mudbricks east of the NE corner of the Tepemankh Mastaba.
Level: 4.1 m
Length: 0.86 m
Orientation: W — E
Skeleton of a child stretched out on its back, the right arm alongside the body, the left arm disintegrated from the elbow down. Skull turned to the left.

58. I 454 (plan 10)
Scattered burial in a wooden coffin. Placed on the surface level.
Level: 4.6 m
Length: Cannot be determined
Orientation: W — E (?)

Only the humeri have survived of the skeleton of an adult male. The original position cannot be determined.

59. **I 455** (plan 9)
Skeleton burial. Placed in a layer of sand coloured by the clay above the collapsed mudbrick wall.
Level: 2.4 m
Length: 0.58 m
Orientation: NW — SE (c. 295°)
Skeleton of a child stretched out on its back, arms alongside the body.

60. **I 456** (plan 9)
Burial in a wooden coffin. Placed in a pit in the mudbrick plateau covering a layer of clay and potsherds. The grave pit was filled in with sand.
Level: 2.5 m
Length: 1.53 m
Orientation: W — E
Skeleton of an adult female stretched out on her back, hands in the lap. Remains of dark-coloured hair on the skull.

61. **I 457** (plan 9)
Wooden coffin found almost empty. Placed in wind-blown sand between the southern wall of the Mastaba and the mudbrick enclosure wall.
Level: 3 m
Length: Cannot be determined.
Orientation: W — E (c. 260°)
Only the skull has survived of the skeleton of an adult male.

62. **I 459** (plan 9)
Skeleton burial. Placed in clay coloured sand, close to the northern edge of the mudbrick enclosure wall.
Level: 3.5 m
Length: 0.57 m
Orientation: W — E (c. 275°)
Skeleton of a child stretched out on its back, hands on the femora, the lower limbs bent to the left. Fragments of linen adhered to the bones.

63. **I 460** (plan 11)
Skeleton burial. Placed in wind-blown sand between the southern wall of the Mastaba and the mudbrick enclosure wall.
Level: 3 m
Length: 1.60 m
Orientation: NW — SE (c. 300°)
Skeleton of an adult female stretched out on her back, arms alongside the body. Crushed skull. Fragments of linen adhere to the whole skeleton.

64. **I 461** (plan 11) (Pl. 17:3)
Burial in a wooden coffin. Placed in sand with small limestone chips.
Level: 3.1 m
Length: 1.30 m
Orientation: W — E (c. 280°)
Skeleton of an adult female stretched out on her back, her left arm alongside the body, the right one bent at the elbow, the forearm obliquely across the pelvis, the bones of the hand on the left side of the pelvis.

65. **I 462** (plan 11) (Pl. 18:1)
Burial in a wooden coffin. Placed in wind-blown sand between the southern wall of the Mastaba and the mudbrick enclosure wall.
Level: 2.9 m
Length: 0.86 m (without skull and leg)
Orientation: W — E (c. 275°)
Skeleton of a child stretched out on its back, the left arm below the thorax, the right arm on it. The skull and bones of the legs are missing, the body was clearly squeezed into the small coffin with force.

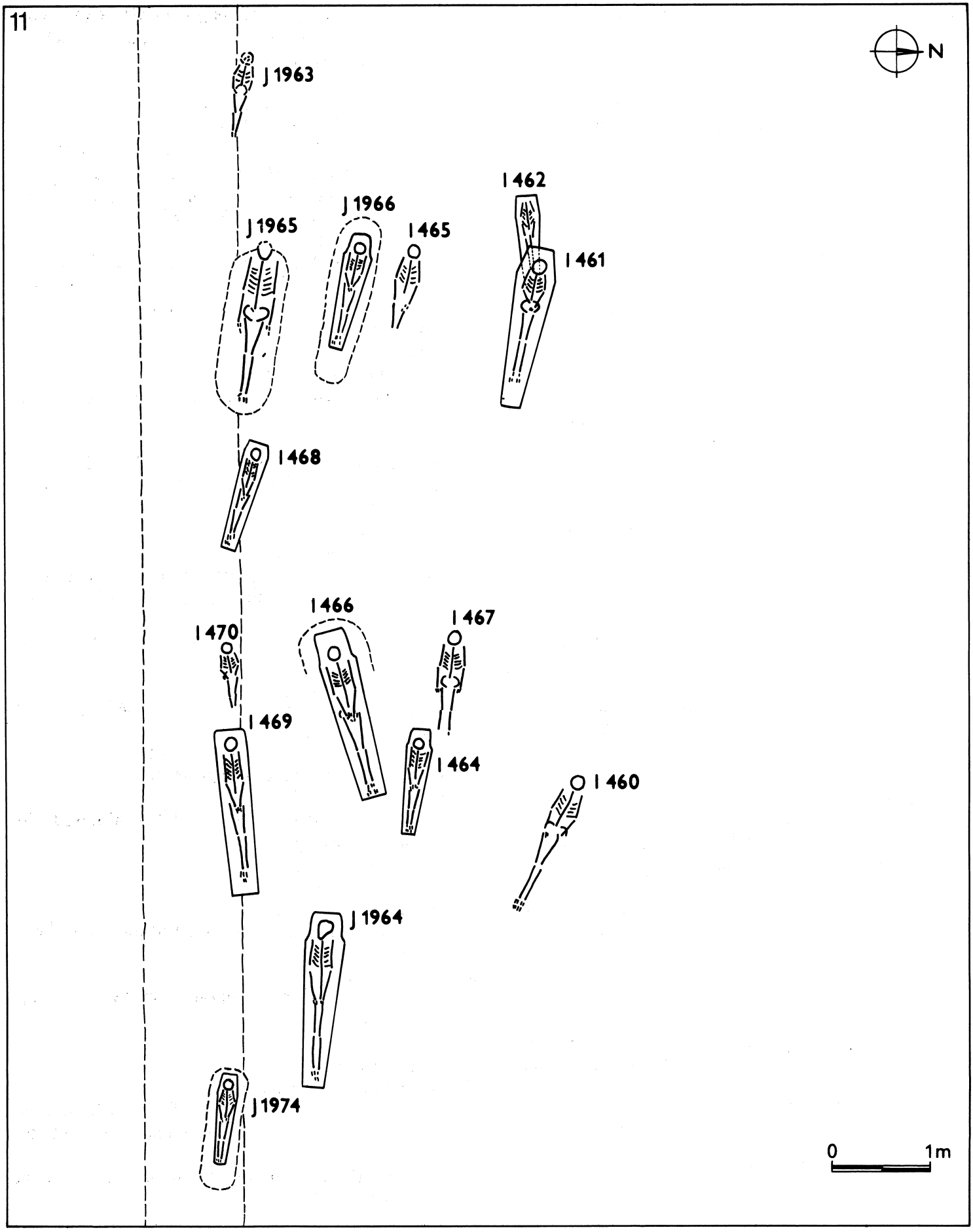
66. **I 464** (plan 11)
Burial in a wooden coffin. Placed in sand coloured dark with the clay from a higher layer of clay and potsherds. The grave pit was filled in with pure sand.
Level: 2.8 m
Length: 0.97 m
Orientation: W — E (c. 275°)
Skeleton of a child stretched out on its back, hands in the lap.

67. **I 465** (plan 11)
Skeleton burial. Placed in a layer of dark sand mixed with clay. The grave pit was filled in with pure sand.
Level: 2.6 m
Length: 0.77 m (surviving part)
Orientation: W — E (c. 285)
Skeleton of a child stretched out on its back, hands in the lap. The bones of the legs and feet have not survived.
Finds: By the left temporal bone, a circular bronze ear-ring,
the same by the right temporal bone,
on the right wrist, a copper bracelet and string with 210 small disc beads,
on the upper part of the chest lay another copper object of uncertain shape, strongly corroded.

68. **I 466** (plan 11)
Burial in a wooden coffin. Placed in sand mixed with clay and stone chips.
Level: 2.6 m
Length: 1.55 m
Orientation: W — E (c. 255°)
Skeleton of an adult male stretched out on his back, hands in the lap.

69. **I 467** (plan 11)
Burial on a board. Placed in sand mixed with clay and stone chips.
Level: 2.5 m
Length: 1.1 m
Orientation: W — E (c. 275°)
Skeleton of a child stretched out on its back, arms alongside the body. Fragments of linen adhered to the bones.
Finds: On the upper part of the chest, an amulet in the shape of god Bes.

70. **I 468** (plan 11)
Burial in a wooden coffin. Placed in a pit made 0.25 m deep into the mudbrick enclosure wall. The grave pit was filled in with sand.
Level: 2.5 m
Length: 1.06 m



Plan 11. Outside the Mastaba — S Part with Fifteen Burials (I 460—I 470, J 1963—J 1974)

Orientation: W — E (c. 285°)
Skeleton of a child stretched out on its back, hands in the lap.
Finds: Around the left wrist a string with 90 small disc beads, a fragment of a tubular head and 5 cowry shells.

71. **I 469** (plan 11)
Burial in a wooden coffin. Placed in a pit in the mud-brick enclosure wall.
Level: 2.5 m
Length: 1.51 m
Orientation: W — E (c. 265°)
Skeleton of an adult female stretched out on her back, hands in the lap.
Finds: On the central part of the coffin lid in the sand, a fragment of a tubular bead.

72. **I 470** (plan 11)
Skeleton burial. Placed in a pit in the mudbrick enclosure wall. The grave pit was filled in with sand.
Level: 2.5 m
Length: 0.58 m
Orientation: W — E (c. 280°)
Skeleton of a child stretched out on its back, hands in the lap. Fragments of linen adhered to the bones.

73. **J 354**
Parietal bones of a skull lying in sand and gravel.
Level: 1.40 m
The bones disintegrated on handling.

74. **J 394** (plan 4) (Pl. 18:2)
Burial in a pottery vessel (CHARVÁT 1981, p. 87, 159, pl.15). Deposited in a layer of sand with small limestone chips. A layer of larger limestone chips remained above the burial (remnants of a destruction plateau?)
Level: 0,60 m
Length: —
Orientation: Mouth of the vessel towards the west.
Mixed-up skeleton of a child in the vessel.

75. **J 542** (plan 4)
Mixed-up skeleton burial. Placed in sand with small limestone chips.
Level: 0.50 m
Length: c. 1.5 m
Orientation: W — E
The disturbed skeleton of an adult male stretched out on his back, the original position of the hands cannot be determined.

76. **J 1483** (plan 12) (Pl. 18:3)
Disturbed burial on a board. Placed in the sand with small limestone chips.
Level: 1.1 m
Length: 0.90 m (without skull, legs and feet)
Orientation: SW — NE
Skeleton of an adult male stretched out on his back, arms alongside the body. Crushed skull, bones of the legs and feet missing.

77. **J 1553** (plan 13) (Pl. 19:1, 2)
Burial wrapped in a coarse mat. Placed in sand with small limestone chips.
Level: 1.60 m
Length: 1.12 m
Orientation: W — E
Skeleton of a child stretched out on its back, hands in the lap.
Finds: By the hands and lower limbs, little shells,
by the right hand, a small amulet,
by the head, a small amulet.

78. **J 1555** (plan 13)
Remnants of a mixed-up burial in the ruins of a wooden coffin. Placed in sand with small limestone chips.
Level: 1.65 m
Length: Cannot be determined
Orientation: S — N
Only the fragments of several bones of the extremities remains of a mixed up burial of an adult female.

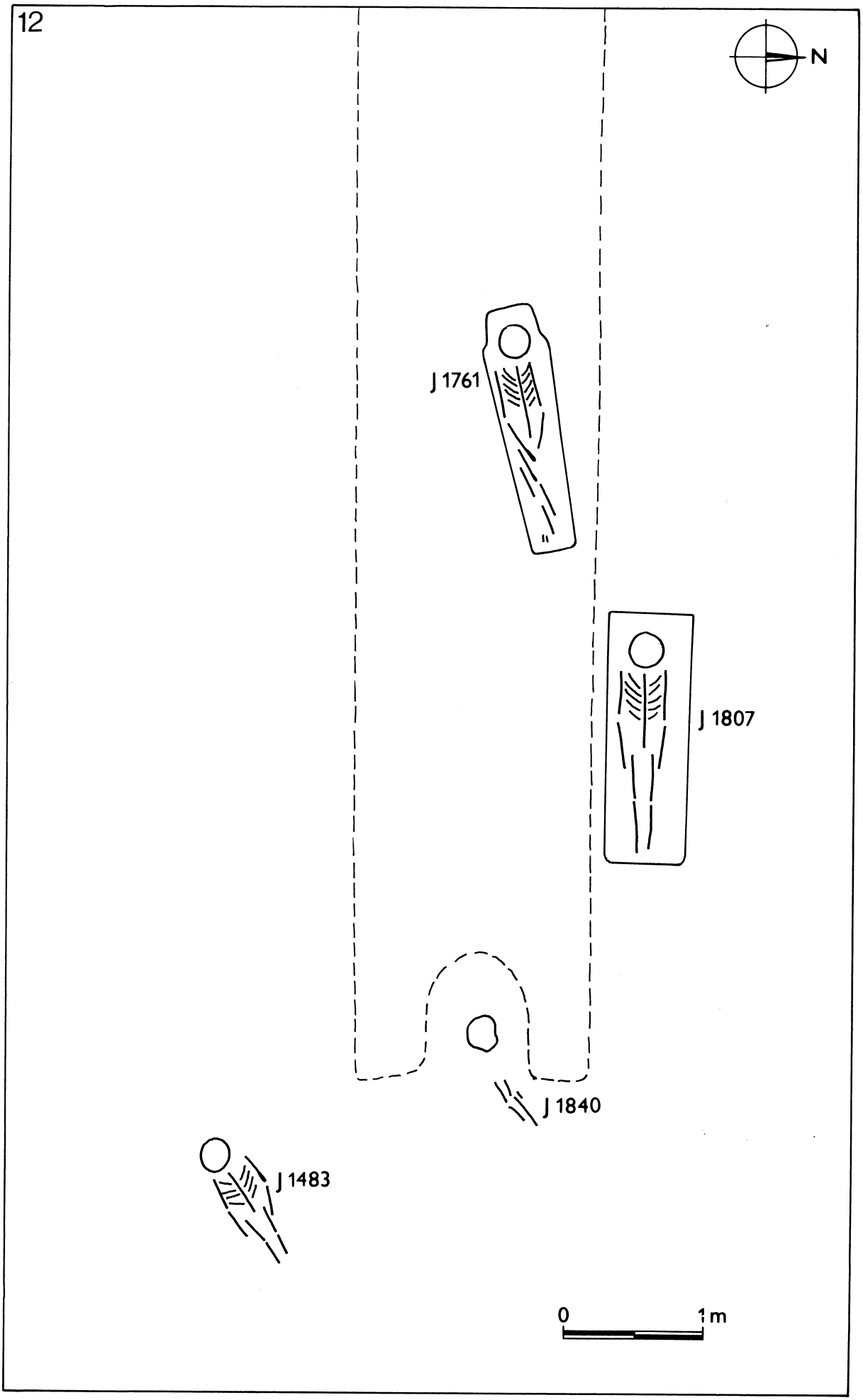
79. **J 1606** (plan 13) (Pl. 19:3)
Skeleton burial. Placed in sand in a rectangular structure of irregular blocks of local limestone (inner dimensions 2.10 by 2.10 m) in front of the eastern wall of the Mastaba.
Level: 1.4 m
Length: 1.94 m
Orientation: N — S
Skeleton of an adult male stretched out on his left side, back leaning against the western side of the stone structure, hands in the lap.
Finds: Alongside the left side lay a wooden stick broken into several pieces.

80. **J 1628** (plan 13)
Burial in a wooden coffin. Placed in sand with small limestone chips.
Level: 1.65 m
Length: 1.80 m
Orientation: E — W
Skeleton of an adult male stretched out on his back, the skull bent to the left. The backbone strongly bent to the left. Hands in the lap.

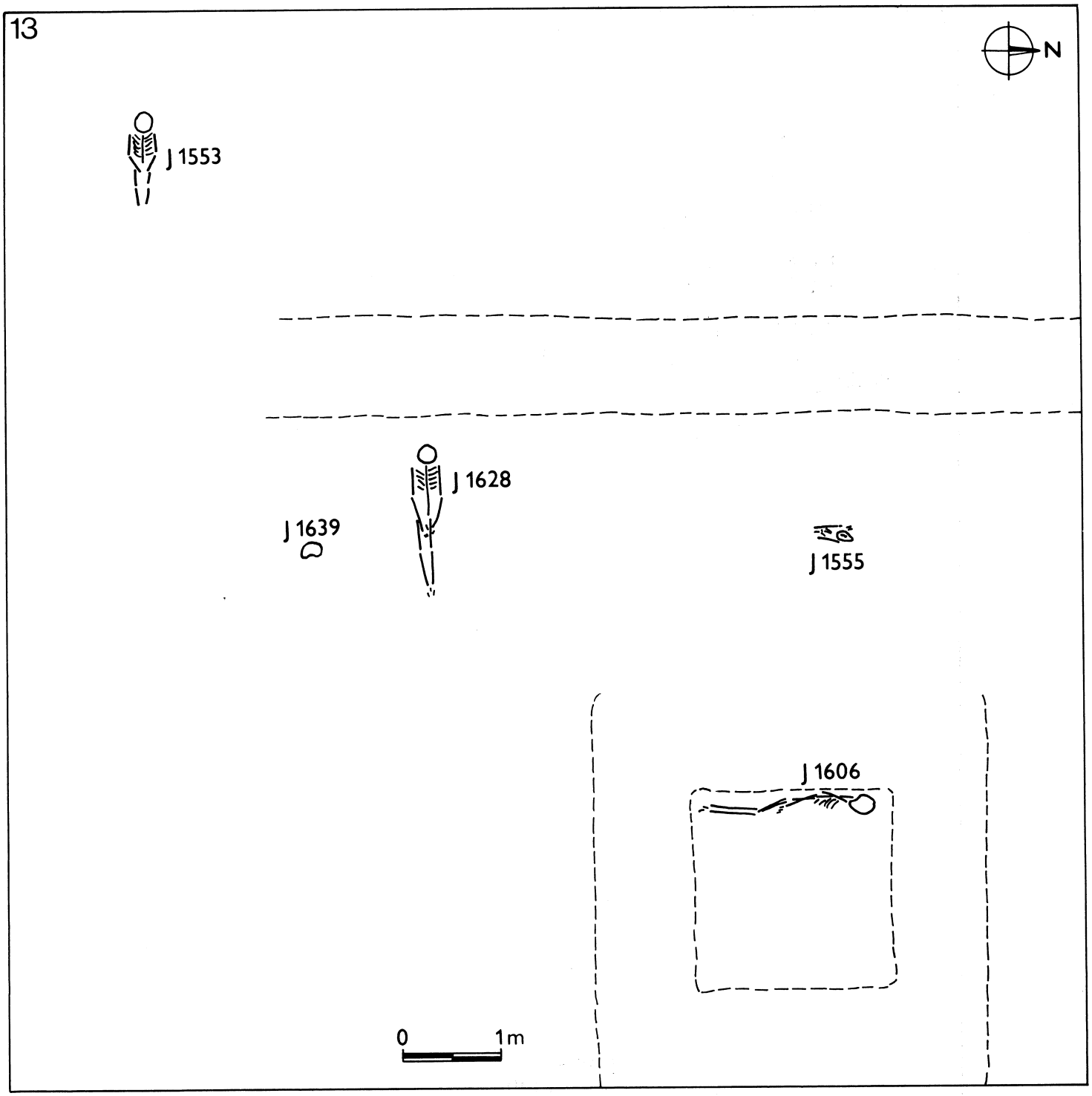
81. **J 1639** (plan 13)
Skull (without the lower jaw).
Level: 1.65 m
Length: Cannot be determined.
Orientation: S — N (?)
Skull of an adult female. The original position of the burial cannot be determined.

82. **J 1744** (Pl. 20:1)
Skeleton burial wrapped in canvas. Placed in a layer of sand with small limestone chips.
Level: 2.5 m
Length: 0.86 m (without legs and feet)
Orientation: S — N
Skeleton of an adult female stretched out on her back, hands in the lap, crushed skull turned to the right. The bones from the knees down are missing.

83. **J 1761** (plan 12) (Pl. 20:2)
Burial in a wooden coffin. Placed in a pit in the mud-brick enclosure wall, the grave pit was filled in with sand.
Level: ± 0
Length: 1.50 m
Orientation: W — E
Skeleton of an adult male in a coffin lying on his left side, hands in the lap. According to the position of the



Plan 12. Outside the Mastaba — NE Part with Four Burials (J 1483—J 1840)



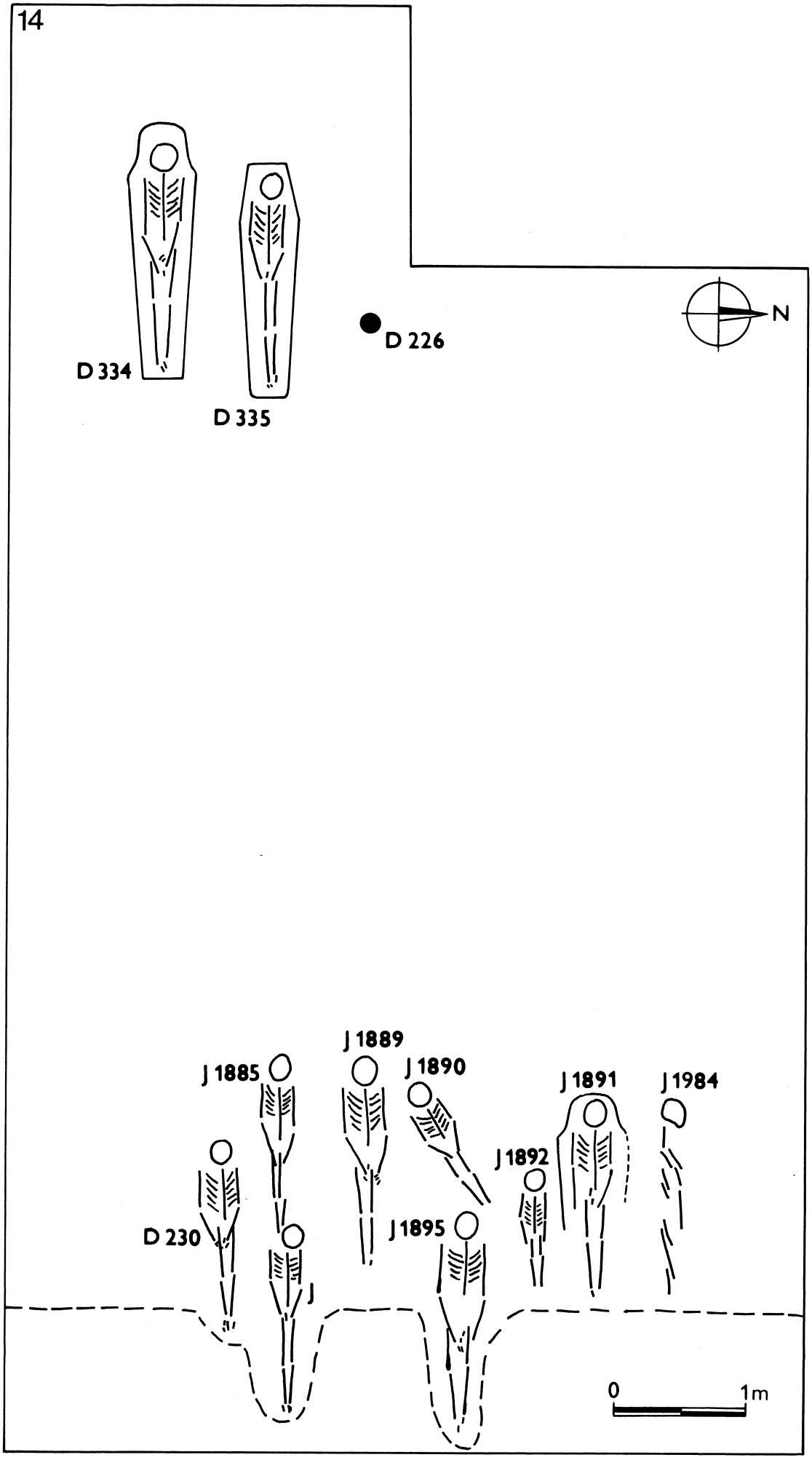
Plan 13. Outside the Mastaba — E Part with Five Burials (J 1553—J 1639)

long bones of the lower limbs, which do not articulate in the hip joint and were placed alongside the pelvis, the body was squeezed into the coffin with force.

84. J 1807 (plan 12)
Burial in a wooden coffin. Placed on the northern edge of the mudbrick enclosure wall.
Level: ±0
Length: 1.65 m
Orientation: W — E
Skeleton of an adult female stretched out on her back, arms alongside the body, skull turned to the right.

85. J 1840 (plan 12)
Scattered burial with remnants of a wooden coffin, placed partly in the eastern recess (w. 0.5 m) of the mudbrick enclosure wall.
Level: 0.15 m
Length: Cannot be determined
Orientation: Probably originally W — E
The skull (without the lower jaw) has survived of the skeleton of an adult male and below it two vertebrae. Beside the recess lay a fragment of the coffin, remnants of linen and the pelvic bone of the same individual.

86. J 1885 (plan 14) (Pl. 20:3)
Skeleton burial. Placed in a layer of sand with small limestone chips.
Level: 1.2 m
Length: 1.00 m



Plan 14. Outside the Mastaba – SE Part with Eleven Burials (D 230–D 335, J 1885–J 1896) and Isolated Skulls (D 226)

Orientation: W — E
Skeleton of a child stretched out on its back, arms alongside the body, skull turned to the right.
Finds: Several shells were found close to the skeleton.

87. **J 1889** (plan 14)
Burial on a board. Placed in a layer of sand with small limestone chips.
Level: 1.1 m
Length: 1.55 m
Orientation: W — E
Skeleton of an adult female stretched out on her back, arms alongside the body. Crushed skull and thorax.

88. **J 1890** (plan 14)
Burial on a board. Placed in a layer of sand with small limestone chips.
Level: 1.15 m
Length: 1.07 m
Orientation: SWW — NEE
Skeleton of a child stretched out on its back, hands in the lap. Remains of muscles and skin have survived.
Finds: by each wrist, a small amulet, two shells and a small corroded fragment of copper were found.

89. **J 1891** (plan 14) (Pl. 21:1)
Burial in a wooden coffin. Placed in a layer of sand with small limestone chips.
Level: 1.2 m
Length: 1.50 m
Orientation: W — E
Skeleton of an adult female stretched out on her back, the right arm alongside the body, the left in the lap. Remains of muscles and skin on the bones.

90. **J 1892** (plan 14) (Pl. 21:1)
Burial on a board. Placed in a layer of sand with small limestone chips.
Level: 1.1 m
Length: 0.87 m
Orientation: W — E
Skeleton of a child stretched out on its back, the right arm alongside the body, the left torn out at the shoulder and placed alongside the left half of the body.
Finds: Close to the burial, small amulets, small beads, shells.

91. **J 1894** (plan 14) (Pl. 21:3)
Skeleton burial. Placed in a layer of sand with small limestone chips.
Level: 1.1 m
Length: 1.55 m
Orientation: W — E
Burial of an adult male secondarily disturbed: Skull on the left side, ribs and vertebrae mixed up, small bones of hands and feet missing.
Finds: By the side of the head, a pottery vessel (CHARVÁT 1981, pp. 109, 151, 156—7, pl. 10).

92. **J 1895** (plan 14)
Burial on a board. Placed in a layer of sand with small limestone chips, the calves resting in a recess in the mudbrick enclosure wall.
Level: 1 m
Length: 1.70 m
Orientation: W — E
Skeleton of an adult female stretched out on her back, arms alongside the body, hands on the femora. In the skull remains of the brain.

93. **J 1896** (plan 14) (Pl. 22:1)
Burial on a board. Placed in a layer of sand with small limestone chips, the calves resting in a recess in the mudbrick enclosure wall.
Level: 1 m
Length: 1.55 m
Orientation: W — E
Skeleton of a juvenile female stretched out on her back, arms alongside the body. The backbone twisted S-shaped to the right in the chest section, to the left in the lumbar region.

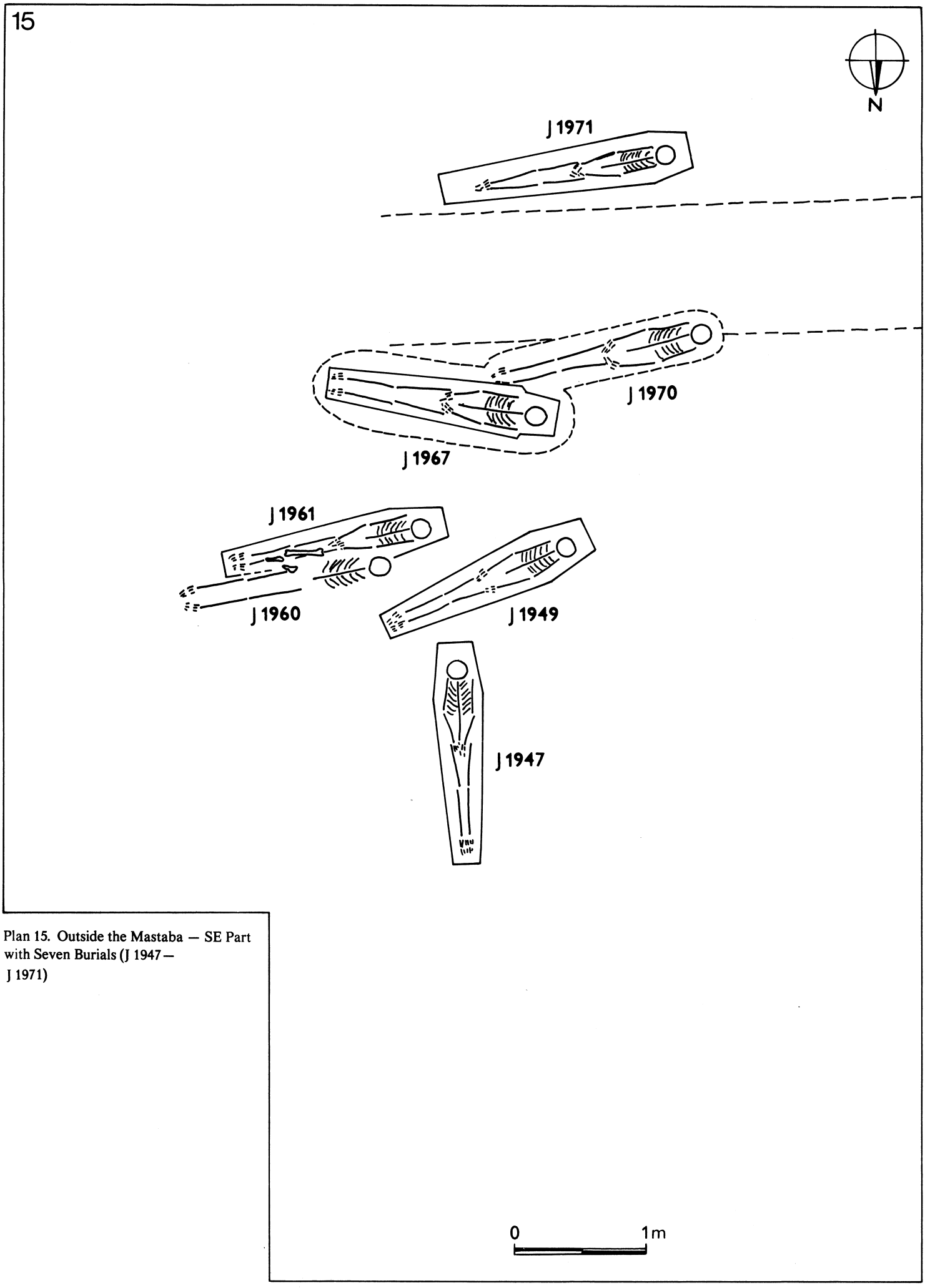
94. **J 1946** (plan 16) (Pl. 22:2)
Skeleton burial. Placed in wind-blown sand.
Level: 3.6 m
Length: 1.45 m
Orientation: SW — NE (c. 245°)
Skeleton of an adult female stretched out on her back, hands on the femora. Crushed skull, crumbling bones of the lower limbs, disintegrated from the middle of the calves. On the skeleton remnants of linen have survived.

95. **J 1947** (plan 15) (Pl. 22:3)
Burial in a wooden coffin. Placed in wind-blown sand.
Level: 2.5 m
Length: 1.45 m
Orientation: S — N
Skeleton of an adult male stretched out on his back, hands in the lap.
Finds: In the sand among the crumbling parts of the lid of the coffin, a small amulet in the shape of Isis nursing Horus.

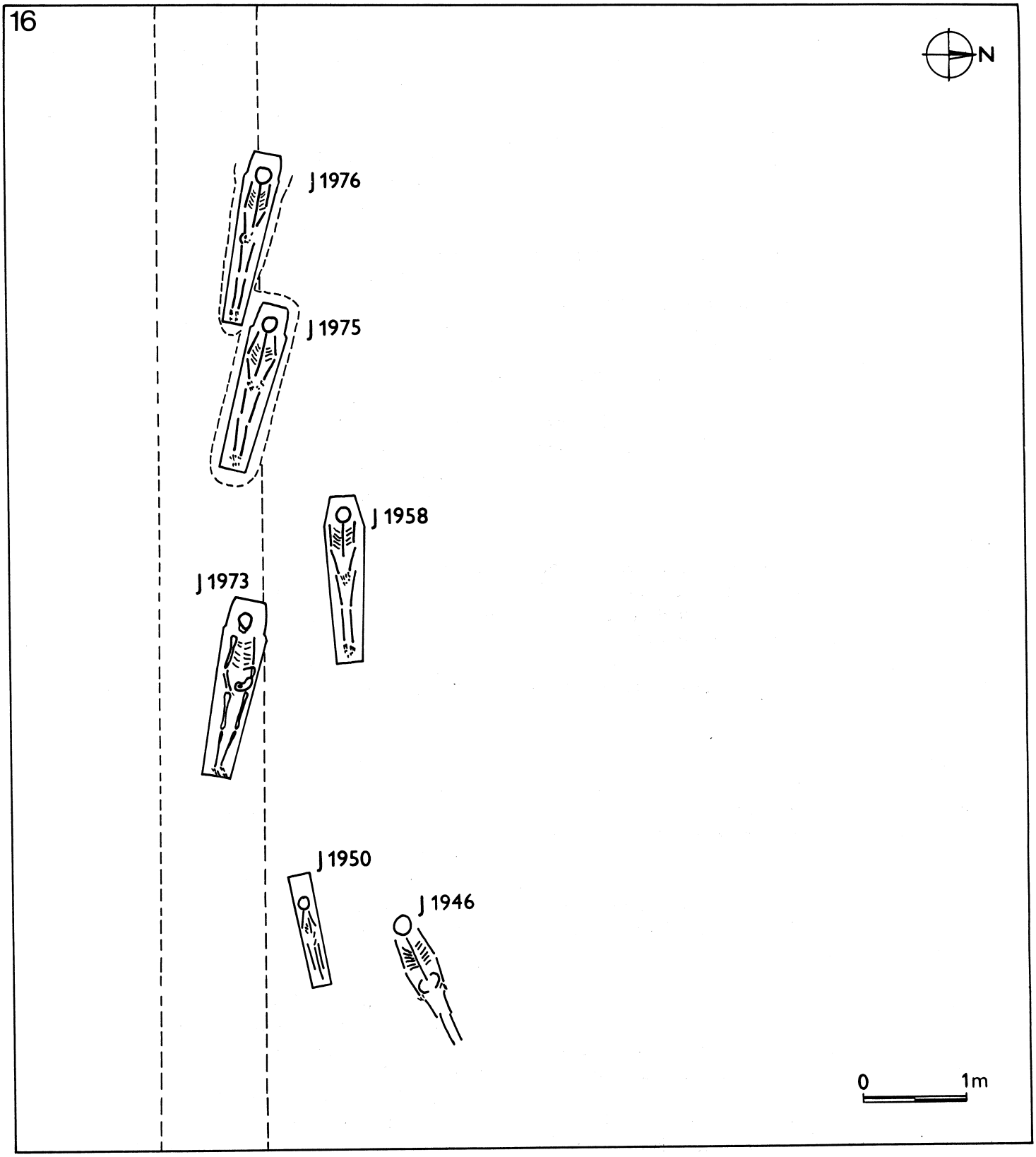
96. **J 1949** (plan 15)
Burial in a wooden coffin. Placed in a layer of dark sand mixed with clay.
Level: 2.4 m
Length: 1.50 m
Orientation: SW — NE (c. 245°)
Skeleton of an adult male stretched out on his back, hands on the femora. Crushed skull.

97. **J 1950** (plan 16)
Burial in a wooden coffin. Placed in wind-blown sand, partly on the top of the collapsed mudbrick enclosure wall.
Level: 2.6 m
Length: 0.9 m (surviving part)
Orientation: W — E (c. 260°)
Skeleton of a juvenile male, interfered with, the body must have been squeezed into a coffin that is too small and had no lid. It is likely to have been used for the secondary burial.
Finds: Small faience amulet in the shape of a simplified udjat.

98. **J 1958** (plan 16)
Burial in a wooden coffin. The burial pit sunk 0.3 m into a darker clay stratum, above which there is clean, wind-blown sand.
Level: 2.5 m



Plan 15. Outside the Mastaba — SE Part with Seven Burials (J 1947 — J 1971)



Plan 16. Outside the Mastaba — S Part with Six Burials (J 1946—J 1976)

Length: 1.45 m
Orientation: W — E
Skeleton of an adult female stretched out on her back, hands in the lap.
Finds: A fragment of a tubular bead.

99. J 1960 (plan 15)
Skeleton burial. Placed in the sand close to the northern edge of the mudbrick enclosure wall.
Level: 2 m
Length: 1.65 m
Orientation: W — E (c. 260°)
Skeleton of an adult female stretched out on her back, the right arm alongside the body, only the bones of the fingers of the left arm survive by the head of the femur. Fragments of linen on the bones (on the neck to a thickness of 0.6 cm).

100. J 1961 (plan 15)
Burial in a wooden coffin. Placed in wind-blown sand.
Level: 1.8 m

Length: 1.55 m
Orientation: W — E (c. 260°)
Skeleton of an adult female stretched out on her back, hands in the lap.

101. J 1963 (plan 11)
Skeleton burial. Placed in a layer of clay and potsherds covering the mudbrick enclosure wall.
Level: 2.5 m
Length: 0.73 m
Orientation: W — E (c. 275°)
Skeleton of a child stretched out on its back, hands in the lap.
Finds: On the right side of the chest, shells, remnants of two copper rings,
around the left wrist, shells,
on the right hand, a copper tubular bead (1. 0.5 cm).

102. J 1964 (plan 11)
Burial in a wooden coffin. Placed in a darker clay layer, partly dug into the northern face of the mudbrick enclosure wall.
Level: 2.8 m
Length: 1.70 m
Orientation: W — E (c. 275°)
Skeleton of an adult female stretched out on her back, hands on the femur, head turned to the left. The backbone deviates to the left in its central part.
Finds: Fragment of a tubular faience bead.

103. J 1965 (plan 11)
Skeleton burial. Placed in a layer of earth and potsherds.
Level: 2.5 m
Length: 1.75 m
Orientation: W — E (c. 275°)
Skeleton of an adult male stretched out on his back, arms alongside the body. Remnants of fabric survive on the bones.

104. J 1966 (plan 11)
Burial in a wooden coffin. Placed in a darker clay layer. Length of the grave pit 1.70 m, depth on the profile 0.43 m to the lid of the coffin.
Level: 2.5 m
Length: 1.05 m
Orientation: W — E (c. 290°)
Skeleton of a child stretched out on its back, hands in the lap. Fragments of linen survive on the bones.

105. J 1967 (plan 15)
Burial in a wooden coffin. Placed in a dark clay layer, the grave pit partly goes into the northern face of the mudbrick enclosure wall.
Level: 2.6 m
Length: 1.65 m
Orientation: W — E (c. 265°)
Skeleton of an adult female stretched out on her back, the left hand in the lap, the right on the femur. Skull turned to the left.

106. J 1970 (plan 15)
Skeleton burial. Placed in a pit in the mudbrick enclosure wall. Depth of pit 0.61 m.
Level: 2.6 m
Length: 1.65 m
Orientation: W — E (c. 255°)
Skeleton of an adult female stretched out on her back, hands in the lap. Fragments of linen adhered to the bones.
Finds: On the ankle of the right leg, a corroded copper anklet.

107. J 1971 (plan 15)
Burial in a wooden coffin. Placed in the sand close to the southern face of the mudbrick enclosure wall (0.35 m below its top).
Level: 2.4 m
Length: 1.58 m
Orientation: W — E (c. 260°)
Skeleton of an adult female stretched out on her back, hands in the lap.

108. J 1973 (plan 16)
Burial in a wooden coffin. Placed on the top of the mudbrick enclosure wall.
Level: 3 m
Length: 1.60 m
Orientation: W — E (c. 285°)
Skeleton of an adult male stretched out on his back, shoulder and thorax pushed down to the spine, the right hand in the lap, the left arm under the pelvis. Two plant stalks lay lengthwise below the skeleton.

109. J 1974 (plan 11)
Burial in a wooden coffin. Placed in a pit in the mudbrick enclosure wall. Length of pit 1.25 m, depth 0.38 m below the top of the wall. The grave pit was filled in with sand mixed with clay.
Level: 2.5 m
Length: 0.87 m
Orientation: W — E (c. 275°)
Skeleton of a child stretched out on its back, hands in the lap.

110. J 1975 (plan 16)
Burial in a wooden coffin. Placed in a pit in the mudbrick enclosure wall. Depth of pit 0.25 m below the top of the wall, filling composed of sand.
Level: 2.65 m
Length: 1.50 m
Orientation: W — E (c. 285°)
Skeleton of an adult female stretched out on her back, hands in the lap.

111. J 1976 (plan 16)
Burial in a wooden coffin. Placed in a pit in the mudbrick enclosure wall. Depth of pit 0.3 m below the top of the wall, filling composed of sand.
Level: 2.5 m
Length: 1.50 m
Orientation: W — E (c. 285°)
Skeleton of an adult male stretched out on his back, hands in the lap. Skull turned to the right.

112. D 226 (plan 14)
Remnants of 3 skulls (**a, b, c**) found isolated in the sand outside the SE corner of the Mastaba. Skulls 226 **a, b** belonged to adult female, D 226 **c** to a child.

113. D 230 (plan 14)
Skeleton burial. Placed in a layer of sand with small limestone chips.

Level: 2 m
Length: 1.54 m (preserved part)
Orientation: W — E
Skeleton of an adult male (D 230 a) stretched out on his back, hands in the lap, skull missing. Fragments of linen adhered to the bones. In the vicinity lay a pile of bones of a child (D 230 b).

114. D 334 (plan 14)
Burial in a wooden coffin. Placed in a layer of sand with small limestone chips.
Level: 2.6 m
Length: 1.68 m
Orientation: W — E
Skeleton of an adult male stretched out on his back, hands on the femora.

115. D 335 (plan 14)
Burial in a wooden coffin. Placed in a layer of sand with small limestone chips.
Level: 2.2 m
Length: 1.55 m
Orientation: W — E
Skeleton of an adult female stretched out on her back, hands on the femora. For technical reasons this skeleton was not lifted.

COFFINS

A) CATALOGUE OF COFFINS

I — Clay Coffins

I 317
Clay. L.: 1.80 m, w.: 0.50 m
Coffin of roughly anthropoid shape with a flat lid. Clay mask painted yellow.

II — Wooden Coffins

II a — *Plain Wooden Coffins without Decoration*

1. **I 293**
Wood. L.: 1.40 m, w.: 0.40 m
Coffin in the shape of an irregular hexagon. Made of short planks. Wooden mask. No painting, without inscription.
2. **I 379**
Wood. L.: 1.3 m, w.: cannot be determined.
Completely disintegrated coffin (only remnants of rotten wood were found scattered in the sand). The original appearance cannot be determined. No traces of decoration were found.
3. **I 390**
Wood. L.: 0,85 m, w. max.: 0.26 m
Coffin in the shape of an irregular hexagon. Without mask. Without painting, no inscription.
4. **I 421**
Wood. L.: 0.85 m, w.: 0.23 m.
Roughly rectangular coffin with a flat lid. Made of small planks, 2—3 cm in thickness. Without mask. Without painting or inscription.
5. **I 454**
Wood. Dimensions cannot be determined.
Rectangular (?) coffin. Remnants of massive planks 2.5—3 cm in thickness, found. No traces of decoration found.
6. **J 1555**
Wood. Dimensions cannot be determined.
Remnants of a coffin, of which only part of the side wall has survived. The original shape cannot be determined. No traces of decoration found.
7. **J 1840**
Wood. Dimensions cannot be determined.
Remnants of a coffin. The original shape cannot be determined. No traces of decoration found.
8. **D 335**
Wood. L.: 1.67 m, w. max.: 0.35 m.
Anthropoid coffin, badly damaged. The original decoration cannot be determined.

II b — *Plain Wooden Coffins Painted White*

1. **I 287**
Wood, white plaster (?). Dimensions not ascertained.
Disintegrating remnants of a coffin in the shape of an irregular hexagon. Clay mask, covered with a layer of white plaster. The coffin disintegrated immediately.
2. **I 380**
Wood, white plaster. L.: 1.53 m, w. max. 0.40 m.
Coffin in the shape of an irregular hexagon, made of short planks. Clay mask. The entire surface of the coffin covered in a layer of white plaster.
3. **I 387**
Wood, white plaster. L.: 0.83 m, w. max.: 0.30 m.
Coffin in the shape of an irregular hexagon. Wooden mask, lappets of the wig modelled in clay on the coffin lid. The entire surface of the coffin covered in a layer of white plaster.
4. **I 403** (Pl. 23:1)
Wood, white plaster. L.: 1.74 m, w. max.: 0.35 m.
Anthropoid coffin with a foot case. Clay mask, lappets of the wig modelled in plaster. The entire surface of the coffin covered in a layer of white plaster.
5. **I 417**
Wood, white plaster. L.: 1.70 m, w. max.: 0.42 m.
Coffin in the shape of an irregular hexagon. Clay mask, lappets of the wig modelled in plaster. The entire surface of the coffin covered in a layer of white plaster.
6. **I 448**
Wood, white plaster. L.: 1.74 m, w. max.: 0.40 m.
Coffin in the shape of an irregular hexagon. Clay mask, lappets of the wig modelled in clay. The entire surface of the coffin covered in a layer of white plaster.
7. **I 457** (Pl. 23:2)
Wood, white plaster. L.: 1.86 m, w. max.: 0.42 m.
Coffin in the shape of an irregular hexagon with a foot case. Clay mask, lappets of the wig modelled in clay. The entire surface of the coffin covered in a layer of white plaster.
8. **I 462** (Pl. 23:3).
Wood, white plaster. L.: 0.90 m, w. max.: 0.38 m.

Coffin in the shape of a prolonged hexagon with a foot case. Clay mask, lappets of the wig modelled in clay. The entire surface of the coffin covered in a layer of white plaster.

9. **I 464**

Wood, white plaster. L.: 1.07 m, w. max.: 0.25 m.

Anthropoid coffin. Clay mask, lappets of the wig modelled of small planks with the addition of clay. The entire surface of the coffin covered in a layer of white plaster.

10. **I 466**

Wood, white plaster. L.: 1.76 m, w. max.: 0.40 m.

Anthropoid coffin. Clay mask, lappets of the wig modelled of small planks with the addition of clay. The entire surface of the coffin covered in a layer of white plaster.

11. **J 1949**

Wood, white plaster. L.: 1.80 m, w. max.: 0.42 m.

Coffin in the shape of an irregular hexagon. Clay mask, lappets of the wig not indicated. The entire surface of the coffin covered in a layer of white plaster.

12. **J 1958**

Wood, white plaster. L.: 1.74 m, w. max.: 0.40 m.

Coffin in the shape of an irregular hexagon. Wooden mask. The entire surface of the coffin covered in a layer of white plaster.

13. **J 1961**

Wood, white plaster. L.: 1.71 m, w. max.: 0.35 m.

Coffin in the shape of an irregular hexagon. Clay mask modelled on a base of a wooden block rounded on the upper part. The entire surface of the coffin covered in a layer of white plaster.

14. **J 1966**

Wood, white plaster. L.: 1.19 m, w. max.: 0.28 m.

Anthropoid coffin. Clay mask, lappets of the wig modelled of small planks with the addition of clay. The entire surface of the coffin covered in a layer of white plaster.

15. **J 1974**

Wood, white plaster. L.: 0.91 m, w. max.: 0.20 m.

Coffin in the shape of an irregular hexagon. Clay mask, lappets of the wig modelled of small planks with the addition of clay. The entire surface of the coffin covered in a layer of white plaster.

16. **J 1976**

Wood, white plaster. L.: 1.70 m, w. max.: 0.35 m.

Anthropoid coffin. Clay mask, lappets of the wig modelled of small planks with the addition of clay. The entire surface of the coffin covered in a layer of white plaster.

II c — *Plain Wooden Coffins with Painted Decorations*

1. **I 273** (Pl. 24:1)

Wood, Dimensions cannot be determined.

The original shape cannot be determined (only remnants of the head of the coffin have survived). Clay mask coloured pink, eyes and eyebrows black, white eyewhite. A wig with the protective wings of a vulture indicated above the mask.

2. **I 294**

Wood, clay. L.: 1.60 m, w. max.: 0.40 m.

Anthropoid coffin. Clay mask. On the chest, polychrome decorations resembling an usekh-collar with several rows of stylized leaves and rosettes. Remnants of a formula beginning dj njswt ḥtp stretch from the waist to the tips of the feet.

3. **I 304**

Wood, clay. L.: 1.55 m, w. max.: 0.40 m.

Anthropoid coffin with a flat lid. Clay mask, wig with long lappets, striped black and yellow. On the chest, remnants of polychrome decoration resembling an usekh-collar. From the knees to the tips of the feet remnants of a formula beginning dj njswt ḥtp (1 column, black on a white ground). All that remains is: ... nṯr ᶜ3, nb r3—sṯ3w ...

4. **I 337**

Wood, clay. L.: 1.83 m, w. max.: 0.45 m.

Anthropoid coffin. Clay mask. On the chest, remnants of polychrome decoration resembling an usekh-collar. No inscription.

5. **I 384** (Pl. 24:2).

Wood, clay. L.: 1.04 m (remaining part to the knees), w. max.: 0.40 m.

Anthropoid coffin. Clay mask coloured pink, eyes and eyebrows black, white eyewhite. Wig with long lappets, stripped black and yellow. On the neck and shoulder red, black, blue and yellow stripes. On the chest, a stylized winged sundisk (red, "wings" blue and yellow). Lower down on the chest, a stylized decoration resembling an usekh-collar: by degrees leaf ornaments (yellow, white, red in colour), a strip with rosettes (blue and red, yellow rosettes), leaf ornaments (yellow, white), a strip of stylized pearls (blue, yellow, red pearls), leaf ornaments (yellow, white, red), a strip of stylized pearls (red on yellow), a strip with rosettes and stylized lotus buds (yellow and white on a blue ground).

From the thigh part of the coffin downwards, remnants of an inscription (1 column, black on a yellow ground, black edge): Dj njswt ḥtp n Wsjr, nb Ddw, nṯr ᶜ3 ...

On each side of the inscription, the Four Sons of Horus, faces turned to one another.

6. **I 393** (Pl. 24:3, 25:1)

Wood, clay. L.: 1.75 m, w. max.: 0.42 m.

Coffin in the shape of an irregular hexagon. Clay mask coloured pink, eyes and eyebrows black, white eyewhite. Wig with long lappets, striped black and yellow. On the chest, remnants of polychrome decorations resembling an usekh-collar ending in clapps in the form of falcon heads: by degrees two rows of stylized pearls (brown on a yellow ground), a chessboard motive (black, yellow, blue), leaf ornaments (yellow, brown), a strip of rosettes (white on a red and blue ground), leaf ornaments (yellow and blue), a strip of stylized pearls (yellow and blue). Below, figures of standing funerary deities edged with blue, white and brown stripes.

From the thigh part downwards, an inscription (1 column black on a yellow ground, black edge):

Dj njswt ḥtp n Wsjr, nb Ddw, nṯr ᶜ3, nb pt, ḥntj jmntjw ...

7. **I 395**

Wood. L.: 1.93 m, w. max.: 0.41 m.

Coffin in the shape of an irregular hexagon. Wooden mask. The lappets of the wig indicated with small wooden planks. Around the mask a simple black line, black contours of the eyes, above the forehead two vertical black lines, the rest of the surface of the coffin without traces of decoration.

8. **I 401**
Wood, clay. L.: 1.76 m, w. max.: 0.44 m.
Anthropoid coffin. Clay mask coloured pink, the eyes and eyebrows black, white eyewhite. Wig with long lappets, striped black and yellow. On the shoulder, strips of yellow, white and red colour. On the chest, polychrome decorations resembling an usekh-collar. Ornament of double leaves (yellow on white), then a chessboard motive (brown, black, blue, yellow), two rows of stylized leaf ornaments (black, red, yellow, blue), a strip of stylized pearls (brown and yellow on a yellow ground), a strip of lotus flowers (light blue on yellow).
From the thigh parts downwards, an inscription (1 column, black on a yellow ground, edged with a stylized strip of blue pearls on a white background): Dj njswt ḥtp n Wsjr, nb Ddw, ntr ᶜ3, nb pt, dj.f qrst nfrt m...(?) ḥrt-ntr ... Wsjr(?) On the sides of the inscription (its upper part), the Four Sons of Horus.
9. **I 405**
Wood, clay. L.: 1.80 m, w. max.: 0.35 m.
Coffin in the shape of an irregular hexagon. Clay mask coloured pink, eyes and eyebrows black, white eyewhite. The coffin is covered with a layer of white plaster, in the central part of the lid there is a black transverse stripe, from which four lengthwise stripes run in the direction of the feet. A black recumbent jackal lies above the transverse strip.
10. **I 406** (Pl. 25:2, 3)
Wood, clay. L.: 1.80 m, w. max.: 0.50 m.
Anthropoid coffin. Clay mask coloured pink, eyes and eyebrows black, white eyewhite. Wig with stylized vulture wings (red on a yellow ground), lappets of the wig black and yellow striped. On the neck, alternating stripes of yellow, blue and red colour. On the chest, polychrome decorations: a winged sundisk (red, "wings" blue and red), further, leaf ornaments (yellow on a blue ground), a chessboard motive (black, red, blue, yellow), two strips of leaf ornaments (blue on white and yellow on blue), a strip of stylized pearls (blue on brown), a strip of stylized lotus buds.
From the waist downwards, an inscription (1 line black on a yellow ground, with a red edge, around it a white and light-blue strip):
Dj njswt ḥtp n Wsjr, nb Ddw, ntr ᶜ3, nb pt, dj.f qrst nfrt m ḥrt-ntr n Wsjr Mnw[6].
11. **I 407** (Pl. 26:1)
Wood, clay. L.: 1.76 m, w. max.: 0.36 m.
Coffin in the shape of an irregular hexagon with a foot case. Clay mask coloured pink, eyes and eyebrows black, white eyewhite. On the neck, alternating strips of brown and red colour. On the chest, polychrome depiction of 3 standing funerary deities. The rest of the surface of the coffin covered in a layer of red-brown colour. On the chest, a black recumbant jackal holding an ostrich feather, below it, an inscription (1 black line on a red-brown ground, blue and black edge): Dj njswt ḥtp n Wsjr, nb Ddw, ntr ᶜ3, nb 3bdw, dj.f prt-hrw t ḥnqt 3pdw sntr mrḥt mnht ḥtpw df3w ḫwt nb ...
12. **I 412** (Pl. 26:2)
Wood, plaster. L.: 1.68 m, w. max.: 0.42 m.
Anthropoid coffin. Clay mask, lappets of the wig modelled of small planks with the addition of clay. The entire surface of the coffin covered in a layer of white plaster. Eyes and eyebrows marked in black as well as a black line above the forehead, which outlines the wig and the top of the mask.
13. **I 415**
Wood, clay. L.: 1.73 m, w. max.: 0.50 m.
Wooden anthropoid coffin with a foot case. Mask made of a small wooden block and clay. The lappets of the wig modelled of small planks with the addition of clay. The whole surface of the coffin covered with a thick layer of grey clay which shapes the form.
14. **I 418**
Wood, clay. L.: 1.97 m, w. max.: 0.40 m.
Coffin in the shape of an irregular hexagon with a foot case. Clay mask coloured pink, black eyes and eyebrows, white eyewhite. Wig and long lappets, striped black and yellow. On the chest, a polychrome decoration imitating an usekh-collar: a stylized winged sundisk (red on a white ground, "wings" white and red), further, two strips of stylized leaf ornaments (black on white, yellow and blue on white), a strip of stylized rosettes (white on a red and blue ground), chessboard motive (black, blue, yellow), two strips of leaf ornaments (yellow on white, white with a black edge), a strip of stylized pearls (yellow and red) and a strip with stylized lotus buds. From the waist downwards, an inscription (1 line, black on a yellow ground, red edge). Along the sides of the upper part of the inscription, the Four Sons of Horus, standing (to the right, Amset, below him, Hapi ape-headed, to the left, Duamutef jackal-headed, below him, Kebehsenuf falcon-headed).
Inscription:
Dj njswt ḥtp n Wsjr, nb Ddw, nb pt, dj.f qrst(?) n Wsjr(?) ... r3 —st3w
15. **I 444**
Wood, clay, plaster. L.: 1.90 m, w. max.: 0.48 m.
Coffin in the shape of an irregular hexagon. Wooden mask. The whole surface of the coffin covered in a layer of clay and yellow-grey plaster. The details of the face painted black (eyes, eyebrows, ears, the line separating the forehead from the wig, transverse line below the chin). The colour has survived on the wood even in those places where the layer of plaster has flaked off.
16. **I 447**
Wood, plaster. L.: 1.89 m, w. max.: 0.40 m.
Coffin in the shape of an irregular hexagon with curved head part. Clay mask. Lappets of the wig modelled of small planks with the addition of clay. The whole coffin covered with a layer of white plaster, on which the eyes, eyebrows and ears are marked in black.
17. **I 456** (Pl. 26:3, 27:1)
Wood, clay, plaster. L.: 1.87 m, w. max.: 0.40 m.
Anthropoid coffin. Clay mask coloured pink, black eyes and eyebrows, white eyewhite. Wig with long lappets modelled of small planks with the addition of clay, lappets

6 The proper name **Mnw** was recorded, among others, in the Late Period (Ranke, PN I, 151.14). In this text the writing is not quite clear, and it may even be a random group of hieroglyphic signs.

coloured black and eyllow. On the neck, alternating strips of yellow, blue and red. On the chest, polychrome decorations imitating an usekh-collar: Stylized winged sundisk (red, "wings" white, red, blue and yellow on a white ground), further, leaf ornaments (yellow on a yellow and blue ground), a strip of stylized red and white rosettes on a red and blue ground), two strips of leaf ornaments (yellow on a yellow and blue ground, and blue on a blue and white ground), a strip of stylized pearls (yellow and red), and a strip of stylized lotus buds. From the waist downwards, an inscription (3 lines, black on a yellow ground, blue edge). Along the sides of the upper part of the text stand the Four Sons of Horus (on the right, Amset, below him, Hapi, ape-headed, to the left, Duamutef, jackal-headed, below him, Kebehsenuf, falcon-headed).
Text:
Middle line:
Dj njswt ḥtp n Wsjr, nb Ddw, nb pt ... qrst ... jm3ḫj ḫr Wsjr Ḥntj[7]
On the right: Dd mdw jn Wsjr nb pt ... nb ḫwt nb ...
On the left: Dd mdw jn ḥtp Wsjr nb pt, prt-ḫrw nfr ... ḫwt nb ...

18. **I 461**
Wood, clay. L.: 1.66 m, w. max.: 0.40 m.
Coffin in the shape of an irregular hexagon with a foot case. Clay mask coloured pink, black eyes and eyebrows, white eyewhite. Wig made up of black and yellow stripes. On the chest, remnants of polychrome decorations imitating an usekh-collar: winged sundisk, strips with leaf ornaments (yellow on a yellow and white ground), a strip of stylized pearls (alternating yellow and red on a yellow ground), stylized lotus flowers.
From the waist downwards, an inscription (1 line, black on a yellow ground, red edge). Along the sides of the inscription there probably were depictions of the Four Sons of Horus (only insignificant remnants have survived).
Inscription:
Dj njswt ḥtp n Wsjr, nb Ddw, nṯr ᶜ3, nb pt ...

19. **I 468**
Wood, clay. L.: 1.15 m, w. max.: 0.25 m.
Coffin in the shape of an irregular hexagon. Clay mask coloured pink, black eyes and eyebrows, white eyewhite. Wig with long lappets decorated with black lines on a white ground. On the chest, a very simplified ornament derived from an usekh-collar: two strips of stylized pearls (blue on a white ground).
In the central part of the lid, an inscription (black on a white ground, red edge):
Dj njswt ḥtp n Wsjr, nb Ddw, nb pt, nṯr ᶜ3 ...
winged sundisk (red, "wings" blue, red, blue, stylized feathers made of black triangles on a white ground), further, a strip of leaf ornaments, a strip of rosettes (alternating yellow and white on a red and blue ground), two strips of leaf ornaments (yellow on a yellow, blue and white ground, blue on a blue ground), a strip of stylized pearls (alternating red and blue on a yellow ground), and a strip with stylized lotus flowers and buds.
From the waist downwards, an inscription (1 line, black on a yellow ground, red edge). Along the sides of its upper part, the figures of the Four Sons of Horus (from the left: Duamutef jackal-headed, Amset, Hapi, ape-headed, Kebehsenuf, falcon-headed).
Inscription:
Dj njswt ḥtp n Wsjr, nb Ddw, nb pt, dj.f qrst nfrt m ḫrt-nṯr n jm3ḫj ḫr Wsjr, nb r3 -st3w[8], jmj wt[9], Bjk[10], m3ᶜ-ḫrw.

21. **J 1628** (Pl. 27:2)
Wood, clay. L.: 1.75 m, w.max.: 0.40 m.
Coffin in the shape of an irregular hexagon. Clay mask coloured pink, black eyes, white eyewhite. The rest of the surface of the coffin covered in a layer of black paint.

22. **J 1761**
Wood, clay. L.: 1.80 m, w. max.: 0.45 m.
Coffin in the shape of an irregular hexagon. Clay mask coloured green, the rest of the surface of the coffin coloured white-pink. Wig marked out in red.
In the centre of the lid, an inscription (one line):
Dj njswt ḥtp n Wsjr, nb Ddw, nṯr ᶜ3, nb pt, ḥntj jmntjw ...

23. **J 1891**
Wood. L.: 1.56 m, w. max.: 0.40 m.
The shape cannot be determined. Without mask. Badly damaged coffin, remnants of red, yellow and black polychromy.

24. **J 1947**
Wood, clay. L.: 1.67 m, w. max.: 0.38 m.
Coffin in the shape of an irregular hexagon. Clay mask. The entire surface covered in a layer of clay.

25. **J 1950** (Pl.27:3)
Wood, clay. L.: 1.10 m, w. max.: 0.22 m.
Rectangular coffin, lid not found. The entire surface covered in a layer of clay.

26. **J 1964**
Wood, clay. L.: 1.82 m, w. max.: 0.40 m.
Anthropoid coffin. Clay mask coloured pink, black eyes and eyebrows, white eyewhite. Wig with long lappets, black and yellow striped. On the shoulder, alternating stripes of yellow, blue and red. On the neck and chest, polychrome decorations imitating an usekh-collar: on the neck, a strip of leaf ornament (yellow and blue), the chessboard motive (blue, red, yellow), a strip of stylized pearls (red and yellow). On the chest there survives a strip of the

7 It is very likely part of a common title **ḥntj jmntjw**. The proper name **Ḥntj** is known from the Greek Period (Ranke, PN I, 272.2) but in entirely different writing.

8 Osiris' title **nb r3—st3w** was common on Memphis stelae from the period of the XXVIth and XXVIIIth Dynasties and often in the shortened version **nb st3w** (Munro 1973, Textband, p. 330: Cairo J. E. 28634, p. 333: Baltimore Walters Art Gallery 285, p. 334: Berlin 7304, Cairo 6/7/24/2).

9 This may be a wrong use of the title of god Anubis **jmj wt** (Wb I, 380)?

10 Ranke, PN I, 93.19. Cf. also Brunsch (1978) p. 75 with the name recorded from the Greek Period. The writing corresponds to the graphic form of the epithet of Horus in the Greek Period (Wb. I, 444).

leaf ornament (blue on a blue and white ground), chessboard motive (blue, red, black, yellow), three strips of the leaf ornament (yellow on blue and white, yellow on white, blue on yellow and blue), a strip of stylized pearls (alternating blue and red on a yellow ground), a strip of stylized lotus flowers and buds. On the lower part of the chest, a bed is depicted with lions' heads and legs, on which the deceased is lying. Along the sides of the bed stand the Four Sons of Horus (from the right, sitting with hands on the knees, standing with an ostrich feather in the hand, similarly on the left). Below the bed, a recumbant jackal is depicted on a pedestal. From the waist downwards an inscription (one line black on a yellow ground, outlined in red with a vertical strip on which white, blue and red patches alternate):

Dj njswt ḥtp n Wsjr, nb Ddw ... ḥrt-nṯr n jm3ḫj ḫr Wsjr.

27. **J 1967**

Wood, clay. L.: 1.67 m, w. max.: 0.40 m.

Anthropoid coffin with a foot case. Clay mask. Lappets of the wig modelled of small planks with the addition of clay. Face, neck and ears coloured pink. The rest of the surface of the coffin covered in a layer of black colour.

28. **J 1971**

Wood, clay. L.: 1.90 m, w. max.: 0.43 m.

Coffin in the shape of an irregular hexagon. Clay mask coloured pink, black eyes and eyebrows, white eyewhite. Wig with long lappets, striped black and yellow. On the neck, alternating strips of yellow, blue and red. On the chest, polychrome decorations imitating an usekh-collar: Stylized winged sundisk (red, "wings" red and blue with stylized feathers depicted by means of black triangles on a white and yellow ground), a strip of the leaf ornament (yellow on yellow and white), the chessboard motive (blue, red, black, yellow), a strip of the leaf ornament (yellow on a ground of blue, yellow, blue and white gripes), a strip of stylized pearls (alternating blue and red on a yellow ground), a strip of stylized lotus buds. Below it, a recumbent jackal (black with a red ribbon aroung the neck).

From the waist downwards, an inscription (1 line in black on a yellow ground, edged with vertical red, blue and white stripes). The Four Sons of Horus along the two sides of the upper part of the inscription.

Inscription:

Dj njswt ḥtp n Wsjr, nb pt, nb Ddw, nṯr ᶜ3 ... qrst nfrt n Ḥr[11]

29. **J 1973**

Wood, clay. L.: 1.75 m, w. max.: 0.45 m.

Anthropoid coffin. Clay mask. Lappets of the wig modelled of small planks with the addition of clay. The whole surface of the coffin covered in a layer of clay and red-brown paint.

30. **J 1975**

Wood, clay. L.: 1.74 m, w. max.: 0.35 m.

Anthropoid coffin. Clay mask, lappets of the wig modelled of small planks with the addition of clay. Mask coloured white, the rest of the surface of the coffin covered in a layer of black paint.

11 In the group of symbols ḫr can be identified with an added r, the rest is incomprehensible. The name Ḥr was common until the very late periods (Ranke, PN I, 245.18, Brunsch 1978, pp. 112–3).

II d — Double Coffins

1. **I 383** (Pl. 28:1)

Wood. Outer coffin: L.: 1.60 m, w. max.: 0.50 m.

Inner coffin: L.: 1.55 m, w. max.: 0.43 m.

Outer coffin: Anthropoid with a wooden mask, lappets of the wig marked by small planks. Face painted yellow-brown, black eyes and eyebrows. Wig decorated with vulture wings (with two rows of stylized feathers). Chessboard motive at the ends of the two lappets of the wig (brown and white).

Inner coffin: Similar decorations.

2. **J 1807** (Pl. 28:2)

Wood. Outer coffin: L.: 1.90 m, w. 0.60 m.

Inner coffin: L.: 1.60 m., w. 0.50 m.

Outer coffin: Rectangular, with a vaulted lid with raised heads. Polychrome decorations (red, blue, black and yellow in colour). On the lid, two couples of falcons and jackals facing each other. In the centre of the lid, an inscription (1 line, yellow on a redground): Dj njswt ḥtp n Wsjr, nb 3bdw, dj.f ... qrst ...

On the right side, remnants of an inscription (1 line):

Dj njswt ḥtp n Wsjr, dj.f qrst nfrt n k3 n Wsjr Ḥtp[12]

Inner coffin: Rectangular, adorned with red, blue, black and yellow paint. In the middle of the lid, a lenghtwise yellow strip with black drawings (parts of the depiction of the Four Sons of Horus survive).

3. **D 334** (Pl. 28:3)

Wood. Outer coffin: L.: 1.92 m, w. max. 0.55 m.

Inner coffin: L.: 1.76 m, w. max. 0.50 m.

Outer coffin: Anthropoid, clay mask coloured pink, black eyes and eyebrows, white eyewhite. On the chest, greatly simplified ornament imitating an usekh-collar: several rows of the leaf ornament (black lines on a white ground).

In the centre of the lid, a line with the text (black on a yellow ground, edged with a red line):

Dj njswt ḥtp n Wsjr, nb Ddw, n Wsjr nb ... nb pt ...

Inner coffin: similar decorations as on the outer coffin. An illegible remnants of an inscription was found on the lid, probably an offering formula.

B/ SITES OF FINDS

The Catalogue comprises a total of 58 coffins of secondary burials. All these coffins were found during excavations outside the Mastaba proper in the 1966 season and particularly in 1970 and 1974. The remnants of the wooden coffins found inside the Mastaba (especially in the area of the Initial Mastaba, i.e. above the burial chamber and in its vicinity) were so insignificant that it was not possible to include them in the Catalogue[13].

The great majority of the coffins (45 out of 58) were found in the area roughly to the south of the Mastaba of Ptahshepses, around the southern and southwestern part

12 Ranke, PN I 257.22 gives this name as recorded for the Late and for the Greek Period.

13 See finds No. 482, 483, D 193 b, E 2295, E 2378 with remnants of yellow stucco, E 2379, E 2715, E 2734 b, c, G 220.

of the mudbrick enclosure wall. Some coffins were deposited directly in pits dug into the wall, which may, to some degree, reflect an endeavour to provide the best possible protection for the burial. Not a single coffin was found with remnants of a grave construction, either above the original level of the terrain or below it. The use of two architectonic fragments which formed a kind of roof (a concave limestone cornice and a fragment of an obelisque) among which coffin I 395 had been inserted, must have been accidental.

The orientation of the majority of coffins was identical. A total of 53 coffins had their head directed towards the west, three to the south (I 304, J 1555, J 1947), and only one (J 1628) to the east. In the case of one coffin (J 1840) it was not possible to determine the original orientation.

All coffins found in the area of the Mastaba of Ptahshepses were in very bad condition and disintegrated immediately on being uncovered. The coffins were in a much worse condition that those found at this burial site during excavations by the German Orient Society at the beginning of the century[14]. The bad condition of the coffins in the area of the Mastaba of Ptahshepses must be ascribed largely to the natural conditions. The coffins were relatively not very deep below the surface (a maximum of 2 metres), and they greatly suffered as a result of surface water. This effect may have been intensified by the large quantity of debris of the wall and other mudbrick structures, which kept the soil damp.[15] Equally unfavourable was the partial opening up of the terrain in the vicinity of some of the coffins. This can be shown in particular on the coffins that were found in 1974, roughly in places where the excavations had come to an end in the previous season. Even the layout of the terrain may have had an unfavourable influence since the Mastaba of Ptahshepses lies 3—4 metres lower than the Mortuary Complex of Nyuserre, and therefore far more moisture was retained in the soil. Some coffins were destroyed also as a consequence of human activity, be it during subsequent burials or when quarrying stone from the tomb.

C/ THE SHAPE OF THE COFFINS

The coffins can be divided into three basic types in regard to shape:

1. Low rectangular coffins of a box-like shape with a flat lid made of whole planks. Only three such coffins were found.
2. Coffins in the shape of an irregular hexagon, which broaden evenly from the head to the chest and become narrower from the chest to the legs, i.e. the head and chest are not strikingly separated. The lid was usually flat or only slightly vaulted. Some of these coffins approached anthropoid coffins by having a foot case. A total of 25 of such coffins was found, and, in type, they clearly came into being by a simplification of the anthropoid coffins.
3. Anthropoid coffins with clearly distinguished head and shoulders. Most often they had vaulted lids, usually also a foot case. A total of 16 coffins of this type was unearthed.

In the case of 10 coffins it is not possible to determine the original shape in view of their badly damaged condition. There was one single clay coffin. Of the three double coffins, two proved to be anthropoid coffins, the remaining case has a box-shaped outer coffin with a vaulted lid, the inner coffin being rectangular.

The coffins were made of wooden planks of varying lengths. Their very bad condition of survival prevented a closer analysis of the manner in which they were made. In almost all cases the coffins were covered with a layer of clay, varying in thickness, which was to form a smooth surface on the coffin and, particularly in some anthropoid coffins, helped shape the external outline of the coffin (particularly in the region of head and shoulders).

On the lids of all plain wooden coffins of the second and third type there were plastically marked faces. The facial masks were most often of clay, less often of wood, or they were made of small wooden blocks with the additon of clay. The lappets of the wig were indicated on the sides of the masks by short planks.

No interconnection was found between the shape of the coffins and their position in the area of the Mastaba.

D/ THE DECORATION OF THE COFFINS

Only painted decorations were found on the coffins in the area outside the Mastaba of Ptahshepses, not a single case of engraved decoration was discovered. The decoration was painted directly on the wood only on one single coffin (I 395). The surface of the majority of coffins was covered in a layer of white plaster. A total of three coffins were painted black, two red-brown (and one of these had polychrome decorations). One was whitish-pink and one yellow-grey (with a painted face).

The decoration most often depicted details of the face (eyes, eyebrows, and ears) which were always painted black (a total of 22 coffins).

In the group of wooden coffins with painted decorations the face was usually coloured pink, the eyes, eyebrows and ears were indicated by a black line, the white of the eye remained white.

In the group of painted coffins other parts were also decorated beside the face. The plastically worked wig with long lappets was usually adorned with black and yellow stripes running along the entire length. Only in the case of two plain coffins was there a pattern imitating the protective wings of vultures on the wig (I 273 and I 406).

The basic element of the decoration of the painted coffins was the imitation of an usekh-collar. In some cases this decoration was highly stylized and formed only several strips on the shoulder and chest with usually alternating blue and yellow colour separated by narrower yellow stripes. On the chest the usekh-collar comprised a simplified leaf ornament (stylized in the form of triangles), sty-

14 Schäfer 1908, passim. It is possible to compare also the bad state of preservation of wooden coffins found near the village of Abusir at roughly the same time (Bonnet 1928, p. 55).

15 I am endebted for this idea to Docent Dr. Z. Uherek, CSc.

lized rows of pearls or the chessboard motives, less frequently rosettes and stylized lotus flowers or buds. Only in one case (I 393) was the collar on a plain coffin finished with clasps in the form of falcon heads.

In a total of 7 coffins the usekh-collar was laid out around the stylized shape of a winged sundisk. On the majority of painted coffins there appeared also depictions of funerary deities. Most often the Four Sons of Horus (on 8 coffins), usually along both sides of the upper part of the inscription, two and two sitting one below the other, turned towards the inscription or standing two and two beside each other. The recumbent jackal, representing the god Anubis, is depicted on three coffins, in one of these cases (I 407), there are apart from him, three standing funerary deities in human form. The most extensive decorations are to be found on coffin J 1964, which apart from the jackal lying on the pedestal, is the only coffin to include a scene with a mummy of the deceased lying on his bed and four figures of anthromorphic funerary deities standing beside the bed (most likely the Four Sons of Horus).

The double coffins of anthropoid type are identical in their decorations to the plain wooden coffins. The rectangular double coffin of a box type follows up, in the decoration of the outer coffin (two couples of jackals and falcons), one of the types current on the coffins of the Late Period and after it.

The decoration of the painted coffins shows a certain degree of advanced craftsmanship. The layout of the decorations on some coffins is to such an extent identical that it may well have come into existence in the same workshop during a relatively limited period of time. But it is also possible that we are dealing merely with an accidental identity of current elements of decoration.

The decorations are usually painted on the adapted surface of the coffin (most often on a layer of white plaster). Colours include black, blue, red, pink, white, to a lesser degrees, yellow, brown and gray-green.

E/ TEXTS ON THE COFFINS

Of the total number of 58 coffins a text appears on 17, always on the outer side. Of this number, 14 were plain anthropoid coffins, on which the text was written in one vertical line in the centre of the lid. On a similar coffin (I 456) there were three lines of text, with the middle one the longest. Two coffins with texts were double ones, and of these coffin J 1807 had the inscription on the lid and one on the right side of the outer box coffin, in the case of coffin D 334 the inscriptions ran in one vertical line in the centre of the outer and the inner coffin. All inscriptions were written vertically with the exception of the inscription on the lengthwise side of the outer coffin J 1807, where it was written horizontaly.

The inscriptions were most frequently written in black on a yellow ground, only in two cases was the text written straight on the surface of the coffin (I 407 on a red-brown, I 468 on a white surface). The edging of the inscription was most often red-brown, in several cases there was ornamental edging (red-blue-white).

With the exception of two shorter formulas on coffin I 456 the texts contained exclusively formulas introduced with the expression dj njswt ḥtp, written in all cases in the manner current in the New Kingdom, i.e. njswt dj ḥtp (BARTA, 1968, p. 261). All texts have no other gods name than that of Osiris. The greatest number of his titles is included in the inscriptions on coffins J 1761 and I 393; nb Ddw, ntr ᶜ3, ḥntj jmntjw. Only the inscription of the outer coffin J 1807 contains the variant nb 3bdw instead of nb Ddw.

The basic request that repeats in almost half of all inscriptions is that of a „beautiful burial" (qrst nfrt) (BARTA 1968, pp. 205 and 212). This request can be assumed also in the case of some coffins where the text has not survived completely. Only two texts contain other requests current at the time, that is, the granting of funerary sacrifice prt-ḥrw (BARTA 1968, pp. 205 and 212).

Coffin I 456 differs from all other coffins with texts in having three lines of an inscription on the lid. The middle one, the longest, contains the considerably distorted formula dj njswt ḥtp. The two shorter inscription alongside it are, in all probability, derived from spells cast by the funerary deities (on this coffin the Four Sons of Horus are depicted).

The inscriptions on the coffins are basically written in simplified hieroglyphic writing. The manner of writing and the layout of the individual signs shows in some cases (I 418, I 468) that the text might not have been understood. This might point to a late period in which these coffins came into being, but we cannot exclude the possibility that the makers of these coffins simply copied texts that they themselves did not understand.

The texts on three coffins start with the simplified sign pt (J 1971, in the case of I 418 and I 456 it is complemented by a triangular mark). This mark does not form part of the text, it is a highly simplified form of the hieroglyphic sign for sky, which, in the Late Period and after it, formed part of the decoration of coffins and used to be placed normally in the centre of the lid above the inscription.

At most in the case of 5 coffins with more complete texts did the inscription possibly also contain the name of the deceased (I 406, I 456?, I 469, J 1807, J 1971). But the manner of writing usually involves doubts whether they were, in fact, proper names or copies of other texts.

F/ DATING OF THE COFFINS

It is difficult to fix the exact dating of plain wooden anthropoid coffins from the second half of the first millenium B. C., often with few decorations or entirely without decoration and text. To a certain extent the words M. L. Buhl written in 1959 are still true: „The uncertainty begins as soon as we have to deal with the sarcophagus from a period after 600/500 B. C., and it is left for the individual egyptologist to decide whether he prefers to label the monuments 'Late Period', 'XXX Dynasty' or 'Ptolemaic Time'." (BUHL, 1959, p. 15). One of the causes of this state is the fact that these plain wooden coffins were often ignored by the archeologists, and when they survived and did not dis-

integrate on the site they were not sufficiently published, at least in the past.[16] These coffins, meant for a not very rich stratum of the population, usually bear the marks of stereotype and traditional forms of decoration and texts, but often they are quite bare. Even an analysis of the shape of the coffins, often surviving in bad condition, does not enable one to date them with greater precision. The coffins deposited in the layers of sand below the surface or among bits of older structures often lack even a more precise archeological context. This applies fully to the coffins of the secondary burials found in the area of the Mastaba of Ptahshepses.

The position of the finds makes precise dating possible only in the case of a small number of coffins, and even so only very roughly. Even though it was possible to trace the stratigraphic situation, especially along the southern wall of the Mastaba where most of the coffins found had been deposited (VERNER 1976 a, p. 34, CHARVÁT 1981, pp. 195—6), the layers could not be clearly dated in view of the small number of exactly dated finds.

In a total of five cases, the coffins were found in superposition. The burial on the board I 335 lay 0.15 m higher than burial I 337 in a painted wooden coffin, placed in the same burial pit. In two cases coffins were in partial superposition: the whitewashed coffin I 380 lay 0.1 m lower than the double coffin I 383, the whitewashed coffin I 462 lay 0.2 m lower than the painted coffin I 461. In two cases skeleton burials and burials in coffins lay in partial superposition: Skeleton burial J 1960 lay 0.2 m higher than burial in a whitewashed coffin J 1961, burial in a black painted coffin J 1967 partly covered skeleton J 1970.

Finds of burials in complete or partial superposition do, therefore, not make it possible to mark the individual types of burials as different time horizons, both in regard to the small number of surviving cases and in view of the fact that, given identical burial ritual (especially orientation), simultaneous burials of several persons might have taken place at the same time.

It is interesting to make a stratigraphic comparison of the burials in coffins with those where larger fragments of the original linen wrapping have survived[17]. These burials, which, with regard to the varying orientation can perhaps be ascribed to the Greek period, are, in most cases, placed in the same or higher stratum than the burials in coffins closest to them. The burials in coffins are, therefore, equally old or older, but the time shift cannot be determined more precisely.

The burials in coffins are relatively more alike even in regard to the funeral rites. The dominant orientation is with the head towards the west (53 coffins)[18], only one coffin (J 1628) was placed in the opposite direction, i.e. head to the east, and three coffins were oriented with the head to the south. The orientation W—E was current from the New Kingdom to the Greek Period (SCHÄFER, 1908, pp. 113, 119—122, pl. 1). The orientation N — S and S — N, on the other hand, was current in the Roman Period (QUIBELL—HAYTER, 1927, pp. 2 — 3). During excavations at Abusir at the beginning of this century L. Borchardt and his collaborators marked all graves oriented E — W as part of the Greek burial site, dated into the 4th century B. C. (SCHÄFER, 1908, p. 113 and pl. 1, WATZINGER 1905, passim). Analogically, burial J 1628 in a black painted coffin can, therefore, be placed in that period (two other black painted coffins, J 1967 and J 1975, were, however, oriented W — E).

From the archaeological point of view a well distinguished group are those burials where the body rests on plant stalks. Of the four documented cases two were placed in coffins[19]. In both cases (I 407 and J 1973) they were rough anthropoid coffins, covered with a layer of red-brown paint; coffin I 407, in addition, had a facial mask painted pink, white, and black in the usually manner and on the lid an inscription accompanied by depictions of the funerary deities. In closeby North Saqqara a similar case is known of a body stiffened with midribs of palm leaves, dated into the Roman Period by the excavators (QUIBELL and HAYTER 1927, p. 2). The similar dating of the two above-mentioned coffins is confirmed by the stratigraphy (both these coffins lay 0.4—0.6 m higher than the next coffin closeby), it corresponds also in the simplified decorations and the confused text on coffin I 407.

The dating of the coffin burials can also be considered in connection with the destruction activity in the area of the Mastaba. A total of three coffins (I 387, I 412, I 417) were completely or partially covered with later destruction plateau, on the other hand, in the filling of coffin burial I 412 there were limestone chips probably coming from this very plateau. The destruction plateau in the area of the Mastaba of Ptahshepses can, of course, be dated only roughly as probably coming from the Roman Period (CHARVÁT 1981, pp. 196, 198), most likely towards its end. Attention should be drawn to the fact that two coffins (D 334 and D 335), which lay in closest vicinity of the outer wall of the Mastaba, were found near the one remaining block of the southern wall that has survived in situ. But there is a possibility that they remained preserved for the very reason that this block, by contrast to the rest, was not removed when the facing was taken apart.

Only a small number of burials in coffins can be connected with the relatively precisely dated finds of pottery. In the vicinity of coffin I 405 a vessel was found that can be dated to the 6th century B. C. (CHARVÁT 1981, pp. 156—7). But the connection between this vessel and burial I 405 is, of course, not entirely clear; (it was found roughly 1 m from the coffin); furthermore, it only gives a dating post quem. The vessel found by coffin I 387 can only roughly be dated into the second half of the first millenium B. C. (CHARVÁT 1981, p. 157). In the vicinity of coffin I 395 potsherds were found datable into the Roman Period (CHARVÁT 1981, pp. 134—5, 176), but this was probably an intrusion.

16 Cf. Petrie 1907, p. 29: „The later burials in Gizeh yielded very little that was worth note, although a large number of tombs were opened..."

17 This refers to skeletal burials I 411, 414, 442, 449, 452, 459, 460, 470, J 1744, 1946, 1960, 1965, 1970, D 230 a, burials on a board I 467 and burials in wooden coffins I 405, J 1840 and J 1966.

18 The orientation W—E was clearly decisive even in the large number of coffins with the deviation as far as NW and SW. Cf. Strouhal 1976, p. 88.

19 Skeletal burials I 397 and I 414, burials in coffins I 407 and J 1973.

Finds of funerary equipment are very poor and difficult to date. Relative wealth can be found on burial I 405, relatively rich were also burials I 387 and I 468, but they did not contain any objects that might be reliably dated.[20]

Similarly there are few facts for dating in the assessment of the decorations on the coffins. Richness of the external decorations can be shown on a group that is relatively unified, of plain wooden coffins[21] with rich black and yellow striped wigs, pink facial masks, rich usekh-collars (often centred around a simplified depiction of the winged sun-disk), depictions of the funerary deities, etc. All these elements of decoration are conceived in conventional manner and repeat to such an extent that it is not possible to arrive at a precise dating of individual coffins on this base[22].

Two coffins of this group (I 273 and I 406) differ in the type of decoration of the wig, which in simplified manner imitates the protective wings of a vulture. This motive was relatively more popular in the Greek Period[23], but it appeared even earlier.

Mention should be made of a unique burial in a double coffin J 1807. On the lid of the outer box coffin were depicted two couples of falcons and jackals. This manner of decoration was current in the period of the 26th to 30th Dynasties[24], but it lasted into the Greek Period[25].

There remains the problem of dating a striking group of coffins with the entire surface covered in a layer of white plaster[26]. According to stratigraphy these coffins can be considered as roughly of similar age or only slightly younger than the richly adorned coffins, which were mentioned above. The use of a pure white surface might have had a number of reasons. From the point of view of shape there is a predominance in this group of coffins in the shape of an irregular hexagon, so it may well be that it was a simplified parallel to the decorated and painted coffins with the aim of speeding up or possibly making their production less expensive. This assumption might be confirmed by coffins with a white surface in which facial details are drawn with black lines (I 412 and I 447). The white colour of the surface might have had some religious and symbolical background (KEES 1943, pp. 444—5), or it might have been a imitation of a sarcophagus of white limestone.

In dating both these groups (i.e. the richly decorated and the whitewashed coffins) one can, from the point of view of stratigraphy, start with the fact that in comparable cases these coffins lay evidently lower than the probably very late coffins I 407 and J 1973. Less clear is their relation to the skeleton burials oriented with the head to the east, which can, in great probability, be atributed to the Greek Period[27]. Basically it is possible to consider the burials in coffins of equal age or older.

The texts on the coffins deserve brief consideration. The overwhelming majority of the texts is written in a manner that suggests lack of comprehension. This regard by itself need not always mean late dating of the coffins, i.e. to the end of the Greek or into the Roman Period[28]. Almost all inscription are written very cursorily and quite mechanically without any endeavours at individual distinction. On the inscriptions that could be read as a whole the name was included perhaps only on coffin I 469, and this name is likely to have come from the Greek Period.

Three texts introduced by the simplified sign pt (N 1 in Gardiner's sign-list) have a parallel in the inscription on the wooden coffins found by Petrie at Hawara and dated into the XXXth Dynasty (PETRIE 1889, pl. V, 1 — 5). The name of the god Osiris appears on funerary formulae quite currently from the 26th Dynasty until the Roman Period (BARTA 1968, p. 225). The orthography in our texts is irregular, but in the surviving texts the form with the pennant ntr (R 8 of Gardiner's sign-list) is most common, and it came into widespread use during the 26th Dynasty and later (LEAHY 1979, p. 146).

It can be assumed that not all inscriptions were comprehended and were more simplified copies of older patterns, in no case, however, was it a matter of more or less accidental groups of roughly copied hieroglyphic signs as they appeared on the Late Roman coffins (BOTTI 1958, pl. XLVII, 1, 2). It may well be that the low level of the inscriptions on the coffins is connected more with the generally low level of craftsmanship and is not a reflection of the late period of origin.

20 The view has been put forward recently that ear-rings ceased to be used in Egypt in the period between the XXVth Dynasty and the Greek Period (Wilkinson 1971, p. 194, Feucht 1982, col. 566—7). In the Mastaba of Ptahshepses ear-rings were found in burials in coffins I 387 and I 405, furthermore, in the simple anthropoid coffin I 444 holes for ear-rings are marked on the lower part of the ears on the coffin lid. The fact that ear-rings are not iconographically recorded does not necessarily mean that they ceased to be used, particularly among the lower strata of the population. This is confirmed by ear-rings CGC 52 454—7 dated into the period of Persian domination (Vernier 1927, pp. 153—4). Herodotus (II, 69), furthermore, writes that in his time ear-rings appeared among the decorations of sacred crocodiles (Kákosy 1982, col. 806).

21 This refers to coffins I 273, 304, 384, 393, 401, 406, 418, 456, 461, 469, J 1969, 1971.

22 For a comparison of the repeated motives of ornamentation one can quote a fairly large set of satisfactorily dated coffins from el-Hibe (Botti 1958, passim). E.g. the motive of the open lotus flower in the **wsh** necklace is recorded in coffins from el-Hibe from the Saite Period (Botti 1958, pl. IV, 1, 3, pp. 21—2) to the Roman Period (ibid., pl. XLVI, 1, pp. 142—3).
To date coffins made by artisans, among which, undoubtedly, those in the Mastaba of Ptahshepses belong, it is difficult to use even the analogy of possibly precisely determined coffins in other excavations. In the broader environment of Memphis there must have been at the time that interests us a number of workshops producing coffins, and their production might have differed one from the other to a varying degree.

23 Botti (1958) gives 12 examples from the Greek Period and only one older or younger. Cf. also Quibell-Hayter (1927, pl. 6, 3).

24 Botti (1958), pl. I, 1 (p. 15—17), IX, 1 (p. 31—32), XVII, 1 (p. 69—70), XXI, 2 (p. 78—9). Petrie (1907) pl. XXXI.

25 Schäfer (1908), pp. 125—6. Cf. also G. Brunton in Engelbach (1946), pp. 236—7.

26 This refers to coffins I 380, 387, 403, 417, 448, 457, 462, 464, 466, J 1949, 1958, 1961, 1966, 1974, 1976 and possibly also the destroyed coffin I 287.

27 In the area south of the Mastaba of Ptahshepses a total of three burials of this type were found — I 411, 441, 442, which can be considered part of the Greek cemetery discovered during the German excavations at the beginning of this century (Schäfer 1908, p. 113, and pl. 1, Watzinger 1905).

28 Cf. on this opinion H. de Meulenaere in CdE XXXIV (1959), pp. 268—9.

Certain aid in dating the burial in the coffins might well be derived from the manner in which the deceased were placed, particularly the position of the hand, given that we accept P. H. K. Gray's method (GRAY 1972, pp. 200 — 204). In the burials in the area of the Mastaba of Ptahshepses the prevailing position of the deceased is stretched out on the back with the hand in the lap[29], which, according to Gray, is typical of the period of the XXVIth Dynasty and later, but older than the Greek Period. That is, of course, a general trend and in individual cases one cannot rule out dating into the Roman Period[30]. Attention should be drawn to the fact that among the burials in the coffins not a single one was laid out in a position that is considered typical of the Greek Period, i.e. with the arms crossed over the chest[31].

The question remains whether the finds of low rectangular coffins (I 421, I 469, J 1950) are related to the more frequently used rectangular coffins of the Greek Period (ENGELBACH 1946, p. 237, BOTTI 1958, pl. XXXV, EDGAR 1905, pl. IV, pp. 8—10). In two cases (I 421, J 1950) they were small quite plain coffins intended for the burial of children, coffin I 469, on the other hand, has comparatively rich decoration including an inscription just like the anthropoid coffins. Its rectangular shape can, therefore, be considered a deviation, which arose as the result of further simplification of anthropoid coffins (Cf. SCHMIDT 1919, p. 258, No. 1516).

Generally, therefore, the majority of coffins of the secondary burials in the area of the Mastaba of Ptahshepses can be dated into the period from the end of the Saitic till the Greek Period, i.e. roughly from the sixth to the first century B. C., while some (e.g. coffins I 407 and J 1973) might have come as late as from the Roman Period. In view of the lack of sufficiently precise data for timing any attempt at detailed dating of each individual coffin would inevitably be far too subjective.

29 This ratio is more striking in burials deposited in coffins. Of the total number of 58 burials in coffins the position on the back with hands in the lap was proved in 32 cases, in five cases the position on the back with hands on the femora, only in two cases the position on the back with arms alongside the body. In 6 cases the position is not entirely clear, in 13 burials it was not possible to be ascertained.

30 Dating into the Roman Period is highly likely in the case e.g. of coffin J 1947, oriented S—N and placed relatively high. This dating is not, moreover, countered even by the results of Gray's research, for the position of the hand in the lap occurs also in mummies of the Roman Period (Gray 1972, pp. 201—2).

31 The same is true also of all preserved burials in this area with one contestable exception of skeletal burial I 446, in which the right arm was stretched out along the body and the left crossed over the chest.

FUNERAL EQUIPMENT

The funeral equipment was poor, as the finds included in the catalogue of the undisturbed burials in the area outside the Mastaba show. The number of objects was further reduced in the case of disturbed or scattered burials, the result of the activity of grave robbers. The objects found can be divided into several groups.

Most frequently there appeared decorative objects of faience and shell — beads, amulets and pendants (sub A). In some burials metal ornaments were discovered — copper and silver bracelets, rings and ear-rings (B). There were a few objects of stone (C).

The wooden objects comprised mainly coffins and their fragments, treated in Chapter 3 and, from a xylotomic aspect, in Chapter 5. Apart from these, further wooden objects (D) were occasionally found. The deceased were protected by being wrapped in linen, of which fragments of varying size survived (E). Plant material was made into mats and string to tie up the deceased (F).

A glass vessel (G) was found in only one grave. On the other hand, there were several pottery finds, even if their connection with the burials cannot be proved in a number of cases (H).

Animal bones and shells of mollusca represent remains of food for the deceased which was placed in the grave. These are dealt with in Chapter 17, concerned with zoological finds.

In the catalogue of funeral equipment that follows we first give the excavation number of the object (E, F, I, J, D), data on its present deposition in the Egyptian Museum in Cairo (EgM) or in the Náprstek Museum in Prague (NpM, with the number of the collection of its Department of Prehistory and Antiquity)[32] and finally the number of the grave.

In the case of some objects no closer identification was carried out during excavations in 1970 and 1974 so that certain catalogue data are missing.

A) DECORATIVE OBJECTS OF FAIENCE AND SHELL

1. **E 1068** NpM P 5394 A 18

a) Barrel-shaped bead, flattened vertically to the axis of the hole. Green faience with nine little white rings with dark-blue centres (arranged alternatingly, one in the middle of the long axis, two side by side). (Pl. 29:1). L. 0.7 cm, ∅ 0.75 cm, ∅ hole 0.25 cm.[33]

b) Fragment of a tubular bead. Light-blue faience. Preserved length 0.8 cm, ∅ 0.4 cm, ∅ hole 0.1 cm.

2. **E 1133** NpM P 5395 A 20

a) Circular disk-shaped pendant, pierced crosswise for suspension. Light greenish-blue faience with a plastically projecting circular black filling added to the centre of one side, to which six grooves run in radial manner (Pl. 29:2).
∅ 1.15—1.3 cm, th. 0.4 cm, ∅ of hole 0.1 cm

b) Flat pendant in the shape of an irregular eight-pointed star, with a crosswise hole for suspension. The points of the star are rounded at the ends. Light green-blue faience, a plastically projecting black filling attached to the centre of one side (Pl. 29:3).
∅ 1.0 cm, th. 0.35 cm, ∅ of hole 0.1 cm.

c) — e) Three tubular beads. Light blue faience.
c: l. 1.55 cm, ∅ 0.2 cm, ∅ of hole 0.05 cm
d: l. 1.1 cm, ∅ 0.2 cm, ∅ of hole 0.05 cm
e: l. 1.2 cm, ∅ 0.3 cm, ∅ of hole 0.05 cm

3. **E 1138** EgM A 21

Barrel-shaped bead flattened towards the axis of the hole, slightly irregular in outline. Light blue faience. L. 0.9 cm, ∅ 1.15 cm, ∅ of hole 0.1 cm.

4. **E 1182** EgM A 23/2

Amulet in the shape of the god Pataikos. Green-blue faience. (Pl. 31:1—2).
H. 4 cm, w. of head 1 cm, w. at shoulder 1.2 cm, w. of base 1 cm, th. of head 0.15 cm, th. of base 0.7 cm.

5. **E 1262** NpM P 5343 A 23/3

Amulet in the shape of an udjat. Blue-green faience, eyebrows and pupils black. (Pl. 32:1).
L. 1.3 cm, h. 1.1 cm, th. 0.3 cm.

32 The numbers of the collection of the Department of Prehistory and Antiquity of the Midle East and Africa in the Náprstek Muzeum, section of the National Museum in Prague, begin with the letter P.

33 In the case of beads length was determined in the axis of the hole, diameter perpendicularly to it.

6. **E 1291** NpM 5396 A 25

a) Tubular bead with rounded ends. Bright blue faience. L. 0.9 cm, ∅ 0.5 cm, ∅ of hole 0.1 cm.

b) Fragment of a tubular bead. Light green-blue faience. Preserved l. 1 cm, ∅ 0.3 cm, ∅ of hole 0.05 cm.

c) Pierced shell of a freshwater slug (Vivipara unicolor)[34]. L. 1.9 cm.

7. **E 1509** EgM A 28

a) — c) Three cylindrical beads with four, three and two bulges. Light blue faience. (Pl. 29:4).
a: l. 0.6 cm, ∅ 0.3 cm, ∅ of hole 0.05 cm
b: l. 0.4 cm, ∅ 0.3 cm, ∅ of hole 0.05 cm
c: l. 0.3 cm, ∅ 0.3 cm, ∅ of hole 0.05 cm.

8. **E 1521** NpM P 5365 A 21

a) Small amulet in the shape of an udjat. Light green-blue faience, eyebows and pupils black. (Pl. 32:2).
L. 0.9 cm, h. 0.6 cm, th. 0.35 cm.

b) Fragment of a tubular bead. Traces of light green-blue faience.
Preserved l. 1.3 cm, ∅ 0.45 cm, ∅ of hole 0.1 cm.

c) Cylindrical bead with three bulges. Blue faience L. 0.4 cm, ∅ 0.25 cm, ∅ of hole 0.05 cm.

9. **E 1547** NpM P 5344 A 21

Amulet in the shape of an udjat. Edge broken off. Clay core covered with blue-green faience, eyebrows and pupils black. (Pl. 32:3).
L. 1.6 cm, h. 1.2 cm, th. 0.5 cm.

10. **E 2026** NpM P 5366 A 36/3

a) Amulet in the shape of an udjat. Light blue faience, eyebrows and pupils black. (Pl. 32:4)
L. 1.9 cm, h. 1.3 cm, th. 0.4 cm.

b) Part of a defective flat amulet of irregular outline (shape of a shoe). Light blue faience.
H. 1.1 cm, w. 0.7 cm, th. 0.45 cm.

c) Tubular bead, compressed on one side. Blue faience. L. 1. cm, ∅ 0.5 cm, ∅ of hole 0.05 cm.

11. **E 2126** EgM A 38

Amulet depicting the god Bes in the shape of the djed column, pierced crosswise in the upper third. Green faience. (Pl. 31:3).
H. 1.2 cm, w. at top 0.5 cm, w. at bottom 0.55 cm, th. at bottom 0.4 cm.

12. **E 2134** NpM P 5345 A 38

Amulet in the shape of an udjat. Green faience, eyebrows and pupils black. (Pl. 32:5).
L. 1.2 cm, h. 0.9 cm, th. 0.3 cm.

13. **E 2153** NpM P 5346 A 39

Amulet depicting a schematic standing human figure, a deity that cannot be more closely determined. Pierced crosswise below shoulder height. The part from the knees downwards is broken off. Clay core, covered with green-blue faience. (Pl. 31:4).
Preserved h. 3.5 cm, w. at shoulder 0.8 cm, th. at the head 1.2 cm.

14. **E 2154** NpM P 5347 A 39

Amulet in the shape of an udjat. Dark green faience, eyebrows and pupils black. (Pl. 32:6).
L. 1.2 cm, h. 0.9 cm, th. 0.25 cm.

15. **E 2169** NpM P 5367 A 36/7

a) Amulet in the shape of an udjat. Grey-brown surface with traces of green-blue faience, eyebrows and pupils grey-black. (Pl. 32:7).
L. 1.5 cm, h. 1.1 cm, th. 0.3 cm.

b) Fragment of a tubular bead. Light green faience. Preserved l. 1.4 cm, ∅ 0.3 cm, ∅ of hole. 0.05 cm. (Pl. 29:5)

c) Fragment of a tubular bead. Green faience.
Preserved l. 1.0 cm, ∅ 0.2 cm, ∅ of hole 0.05 cm. (Pl. 29:5).

d) Barrel-shaped bead, flattened vertically to the axis of the hole. (Pl. 29:5).
L. 0.85 cm, ∅ 1.0 cm, ∅ of hole 0.25 cm.

16. **E 2178** NpM P 5399 A 36/8

Miniature cylindrical bead. Light green faience.
L. 0.2 cm, ∅ 0.25 cm.

17. **E 2181** EgM A 36/9

Amulet in the shape of an udjat. Green, in places brownish faience, eyebrows and pupils black.
L. 1.2 cm, h. 0.9 cm, th. 0.3 cm.

18. **E 2207** NpM P 5368 A 44/1

a) Amulet in the shape of an udjat. Light green faience, eyebrows indicated by downward hatched engraving, eye with pupil and two vertical grooves on the tear incised. (Pl. 32:8).
L. 1.8 cm, h. 1.1 cm, th. 0.25 cm.

b — f) Five tubular beads. Green-blue, on f) faded faience.
b: l. 1.3 cm, ∅ 0.4 cm.
c: l. 1.3 cm, ∅ 0.3 cm.
d: l. 1.8 cm, ∅ 0.3 cm.
e: l. 1.3 cm, ∅ 0.3 cm.
f: l. 1.4 cm, ∅ 0.3 cm.

19. **E 2337** NpM P 5348 A 43/3

Amulet in the shape of an udjat. Dark green faience, pupils and eyebrows black, further details engraved. (Pl. 32:9).
L. 1 cm, h. 0.8 cm, th. 0.35 cm.

20. **E 2517** NpM 5350 A 44/2

Amulet in the shape of an udjat. Light blue faience, pupils black, eyebrows and other details engraved. (Pl. 32:10).
L. 1.7 cm, h. 1.1 cm, th. 0.35 cm.

21. **E 2698** NpM P 5351 A 46

Amulet in the shape of an udjat. Green-blue faience, eyebrows and pupils black. (Pl. 32:11).
L. 1.3 cm, h. 1 cm, th. 0.25 cm.

22. **E 2704** NpM P 5352 A 46

a) Amulet in the shape of an udjat. Blue-green faience, eyebrows and pupils black. (Pl. 32:12).
L. 1.2 cm, h. 0.85 cm, th. 0.25 cm.

b) Amulet in the schematic shape of a sitting cat, the symbol of the goddess Bastet, pierced crosswise. Green--blue faience. (Pl. 31:5-6).
H. 1.2 cm, w. of head 0.5 cm, th. of head 0.7 cm.

c) Amulet in the schematic shape of Isis holding Horus on lap. Pierced crosswise. Green-blue faience. (Pl. 31:7-8).
H. 1.2 cm, w. 0.35, th. of base 0.6 cm.

23. **F 113** EgM A 7

a — d) Two loose beads (a, b) and two threaded on a string (c, d) in the shape of a stylized ankh. Pierced

34 According to the identification by RNDr. V. Pfleger, Department of Zoology of the Natural History Museum, section of the National Museum in Prague.

crosswice on the upper edge. One of the loose beads (b) is broken off at the bottom (Pl. 29:6).
H. a: 1.3 cm, b: 1.2 cm, c: 1.3 cm, d: 1.4 cm.

e) Miniature disk-shaped bead, threaded on a string between **c** and **d**. Green faience.
∅ 0.2 cm.

f – h) Miniature disk-shaped beads, threaded on a string, two between **c** and **d**, one after **d**. ∅ 0.2 cm.

24. **F 115** NpM P 5401 A 7

15 miniature disk-shaped beads, 13 of these on the original string. Greenish, brownish or white faience. (Pl. 29:7).
∅ 0.4–0.5 cm, th. 0.1–0.2 cm.

25. **F 116** NpM P 5402 A 9

7 miniature disk-shaped beads and 4 cylindrical beads, one with four, three with 2 bulges. Blue, greenish, whitish-yellow and brown faience. (Pl. 29:8).
∅ 0.2–0.4 cm, th. 0.1–0.2 cm.

26. **F 117** NpM P 5403 A 9

a) 2 tubular beads. Green-blue faience.
L. 2 cm, 2,8 cm, ∅ 0.3, 0.4 cm.

b) 24 fragments of tubular beads. Green-blue faience.
L. 0.8–2 cm, ∅ 0.3–0.4 cm.

c) 5 short cylindrical beads. Green-blue to blue faience.
L. 0.4–0.6 cm, ∅ 0.5–0.7 cm.

d) Miniature disk-shaped bead. Light green faience.
∅ 0.25 cm, th. 0.1 cm.

e) Fragments of two full, bent rods. Green and blue faience.
L. 1.25 cm, 1.45 cm, ∅ 0..21 cm.

27. **F 134 B** NpM P 5404 (Pl. 30:1) A 13

a) Pendant of three lengthwise linked little tubes. Blue faience.
L. 1.2 cm, w. 1 cm, ∅ of hole 0.1 cm.

b) Slightly curved, long tubular bead. Blue-green faience.
L. 5 cm, ∅ of hole 0.1 cm.

c) 17 disk-shaped beads on a string. Blue faience. ∅ 0.3 cm, th. 0.1 cm.

d) 10 disk-shaped beads on a string. Blue faience. ∅ 0.2 cm, th. 0.1 cm.

e) Disk-shaped beads pasted together forming a group of four and two groups of two. Blue faience.
∅ 0.2 cm, th. 0.4 cm, 0.2 cm, 0.2 cm.

f) 25 disk-shaped beads, partly on a string and partly loose. Blue, green-blue and green faience.
∅ 0.2 cm, th. 0.1 cm.

g) Disk-shaped bead. Green faience.
∅ 0.4 cm, th. 0.15 cm.

h) Two disk-shaped beads. Black faience.
∅ 0.35 cm, th. 0.25 cm.

i) Disk-shaped bead. Yellow faience.
∅ 0.2 cm, th. 0.1 cm.

j) Two disk-shaped beads. Pink faience.
∅ 0.2 cm, th. 0.1 cm.

k) 39 disk-shaped beads strung on a string. Black (B) and yellow-white (Y) (beige) faience. They are strung up in this order:
BYBBYBYBBYBBBYBYBYBBBYBBYBYBYBYBBY-BYBYBYB.
∅ 0.3 cm, th. 0.1 cm.
A total of 144 beads was found (sub b–k).

28. **F 135** EgM A 13

a) Amulet in the shape of a schematic human figure with a dog's head depicting the god Anubis. Light blue faience. (Pl. 31:9).
H. 2.5 cm, w. on base 1 cm.

b) Amulet in the shape of a schematic human figure with falcon's head depicting the god Horus. Blue faience. (Pl. 31:10).
H. 2.2 cm, w. on base 1 cm.

c) Amulet in the shape of a sitting cat, the incarnation of the goddess Bastet. Blue faience. (Pl. 31:11).
H. 1.45 cm, w. on base 0.7 cm.

d) Larger disk-shaped bead. Blue-green faience.
∅ 0.95 cm, th. 0.05 cm, ∅ of hole 0.1 cm.

e) 2 cylindrical beads, one with 3, the other with 5 bulges, on a string. Blue faience.
∅ 0.25 cm, th. 0.1 cm.

f) 5 disk-shaped beads on a string, 4 blue, 1 green faience.
∅ 0.25 cm, th. 0.1 cm.

g) Cylindrical bead with 2 bulges. Blue faience.
∅ 0.25 cm, th. 0.1 cm.

29. **F 152** NpM P 5405 A 13

53 disk-shaped beads on a string. Black faience. (Pl. 30:2).
∅ 0.2 cm, th. 0.1 cm.

30. **F 245** EgM A 12

Pendant of six lengthwise linked little tubes. Blue-green faience.
L. (along the axis of the tubes) 1.3 cm, w. 2.5 cm, ∅ of each rod 0.4 cm.

31. **F 296** NpM a-c: P 5408, d-e: P 5409 A 27

a) Fragment of a tubular bead. Blue faience.
Preserved l. 0.9 cm, ∅ 0.35 cm.

b) 16 miniature disk-shaped beads on a string. Light blue faience.
∅ 0.3 cm, th. 0.1 cm.

c) 35 and 38 miniature disk-shaped beads, both groups on strings. Brown to black faience.
∅ 0.2–0.3 cm, th. 0.15 cm.

d) 19 disk-shaped beads on the original string. Alternating brown and white faience. (Pl. 30:3).
∅ 0.35 cm, th. 0.25 cm.

e) Pendant of six lengthwise linked little tubes. White faience. (Pl. 30:4).
L. along the axis of the little tubes 1.2 cm, w. 2.4 cm, ∅ of each little tube 0.4 cm.
A total of 109 beads was found (sub a-d).

32. **I 273** EgM I 273

a) Amulet in the shape of the god Bes.

b) 9 udjat amulets. (Pl. 33:1).

33. **I 305** NpM a: P 5423, c: 5424 I 305

a) 53 little pendants in the shape of rectangular little plates with a flat back and a slightly convex front. They are pierced lengthwise and have three parallel lengthwise slits (simplified udjat). (Pl. 30:5).
L. 0.6–0.7 cm, h. 0.6–0.9 cm, th. 0.2–0.3 cm.

b) Tubular bead. Blue faience.
L. 0.65 cm, ∅ 0.5 cm.

c) 24 cowry shells with the back removed. (Pl. 33:2).
L. 1.4–1.8 cm.

34. **I 313** NpM P 5381 I 313
a) Uadj amulet. Light green faience.
L. 2.3 cm. (Pl. 33:3).
b) Fragment of a tubular bead. Light green faience.
L. 1.2 cm, ∅ 0.35 cm.
c) Part of a cowry shell.
L. 1.1 cm.

35. **I 374/2** EgM I 374/2
Several cowry shells (necklace).

36. **I 390** EgM I 390
Several cowry shells (necklace).

37. **I 400** EgM 1 400
Amulet in the shape of the god Bes, flat, oval, pierced lengthwise in the middle. Light green faience, eyes, eyebrows and some feathers of the crown black.
H. 4.8 cm, w. 4.4 cm, th. 0.5—0.6 cm.

38. **I 411** NpM P 5425 I 411
Fragment of a tubular bead. Light green faience.
Preserved l. 1.0 cm, ∅ 0.3 cm.
One bead. Light green faience.

39. **I 413** EgM I 413
One bead. Light green faience.

40. **I 465** NpM P 5427 I 465
210 small disk-shaped beads. Light green faience.
∅ 0.4—0.5 cm, th. 0.1—0.2 cm.

41. **I 467** EgM I 467
Amulet in the shape of the god Bes. Light green faience.

42. **I 468** NpM P 5428 I 468
a) 90 small disk-shaped beads. Light green faience.
∅ 0.3—0.4 cm, th. 0.1—0.2 cm.
b) Fragment of a tubular bead. Light green faience.
Preserved l. 1.3 cm, ∅ 0.35 cm.
c) 5 cowry shells.
L. 1.3—1.5 cm.

43. **I 469** NpM P 5429 I 469
Fragment of a tubular bead. Whitish faience.
Preserved 1. 1 cm, ∅ 0.3 cm.

44. **J 1553** EgM J 1553
a) Several cowry shells.
b) Amulet — shape and dimensions missing in the records.
c) Amulet — shape and dimensions missing in the records.

45. **J 1885** EgM J 1885
Several cowry shells.

46. **J 1890** EgM J 1890
a) Amulet — shape and dimensions missing in the records.
b) 2 cowry shells.

47. **J 1892** EgM J 1892
a) Several small amulets — shape and dimensions missing in the records.
b) Several small beads — shape and dimensions missing in the records.
c) Several cowry shells.

48. **J 1947** EgM J 1947
Amulet in the shape of Isis holding Horus on lap. Light green faience. Dimensions missing.

49. **J 1950** NpM P 5437 J 1950
Pendant in the shape of a rectangular little plate with flat back and slightly convex front. Pierced lengthwise, with three parallel lengthwise slits (simplified udjat?) (Pl. 33:4).
L. 0.7 cm, h. 0.6 cm, th. 0.3 cm.

50. **J 1958** NpM P 5438 J 1958
Fragment of a tubular bead. Light green faience. L. 0.9 cm, ∅ 0.3 cm.

51. **J 1963** NpM P 5439 J 1963
5 cowry shells with the back removed, probably part of a bracelet.
L. 1.5—1.8 cm.

52. **J 1964** NpM P 5440 J 1964
Small fragment of a tubular bead. Light green faience.
Preserved l. 0.6 cm, ∅ 0.5 cm.

53. **D 227** EgM D 226 c
a) 13 cowry shells, cut away at the back, probably part of a necklace.
L. 1.6—1.9 cm, w. 1—1.2 cm, th. 0.5—0.75 cm.
b) Udjat amulet. Green faience, without marking of the eyebrows and pupils.
L. 1.4 cm, h. 1.15 cm, th. 0.4 cm, ∅ of hole along the lengthwise axis 0.1 cm.
c) Amulet in the shape of a perforated plate with an inscribed stylized udjat. Green faience.
L. 1.2 cm, h. 1.1 cm, th. 0.35 cm, ∅ of hole 0.2 cm.
d) Pendant in the shape of a square plate with rounded corners, flat back and slightly convex front. The two opposite sides are straight, two others convex and denticulated. Pierced along the lengthwise axis and given four parallel lengthwise slits. It represents most probably a double simplified udjat. Green faience.
L. 1.4 cm, h. 1.4 cm, th. 0.4 cm, ∅ of hole 0.1 cm.
e) Similar pendant in the shape of a small square little plate with rounded corners. Green faience.
L. 1.4 cm, h. 1 cm, th. 0.4 cm, ∅ of hole 0.1 cm.
f) Amulet in the shape of an elephant with lengthwise perforated holder on the back. Green faience, blueish in the centre.
L. 1.25 cm, h. 1.5 cm, th. 0.5 cm, ∅ of hole 0.2 cm.

B) METAL ORNAMENTS

1. **E 2337** — A 43/3
Fragment thickly covered in verdigris. Copper. The object disintegrated on being lifted. Dimensions not ascertained.

2. **F 134 C** NpM P 5297 A 13
Miniature rectangular plate. Copper, both sides covered with a thick layer of verdigris. (Pl. 34:1).
L. 2.8 cm, w. 2 cm, th. originally 0.8 cm, th. with verdigris 1.4 cm.

3. **I 305** NpM P 5305 I 305
a) Small circle, perhaps a child's ring. Iron.
∅ 1—1.2 cm.
b) 6 fragments of a chain of miniature rings, part of earrings. Copper.
0.3—0.5 cm.
c) 2 fragments of a bracelet of thick wire. Copper, disintegrating surface.
L. 1.5 and 1.2 cm, th. 0.3 cm.

4. **I 305** NpM P 5306 I 305
Small massive bracelet of thick wire with open ends which overlap 1.4 cm. Copper.

∅ 3.8—4.2 cm, th. 0.5 cm.

5. **I 313** NpM P 5307 I 313
2 rings with open ends, children's ear-rings or rings. Copper.
∅ 0.7 cm, th. 0.2 cm.

6. **I 327** NpM P 5308 I 327
Ring of thick wire originally, in 4 fragments, probably a bracelet. Copper. (Pl. 34:2).
∅ probably 3.8 cm, th. 0.4 cm.

7. **I 387** NpM P 5311 I 387
Fragments of a more massive ring, probably a bracelet. Iron.
∅ probably 6 cm, th. 0.5 cm, l. of fragments 4.5 cm and 3.1 cm.

8. **I 387** NpM P 5312 I 387
Ring of thick wire with open slightly overlapping ends, probably a child's bracelet.
Copper. Circular shape probably secondarily deformed. (Pl. 34:3).
∅ 4.5—5 cm, th. 0.4 cm.

9. **I 387** — I 387
a) Fragments of a more massive ring, probably a bracelet. Iron. Disintegrated on being lifted. Dimensions not ascertained.
b) Small circle, ear-ring. Copper. Disintegrated on being lifted. Dimensions not ascertained.

10. **I 405** EgM I 405
a) Collar of corroded silver and agate pearls. Part of it was formed by a corroded silver medallion, convex in the centre and a copper (?) pendant in the shape of a sphere with a conical base.
∅ of medallion 4.15 cm.
b) Bracelet of thick wire. Copper.
∅ 7.15 cm, th. 0.75 cm.
c) Two rings. Corroded silver.
Ring 1: ∅ 1.9—2.2 cm, th. 0.4 cm.
Ring 2: ∅ 1.9 cm, th. 0.2 cm.

11. **I 441** — I 441
Fragment of a ring. Copper, strongly corroded. The object disintegrated on being lifted. Dimensions not ascertained.

12. **I 444** NpM P 5313 I 444
a) Ring of thick wire in 3 fragments, most likely a ring. Copper.
∅ 2.4 cm, ∅ 0.3 cm.
b) Unclear fragment of an object in the shape of a miniature arrow with a tang. Copper, one side flat, the other covered with a thick layer of verdigris.
L. 1.8 cm, preserved w. 1.3 cm.

13. **I 465** NpM P 5314 I 465
Two small rings with unclosed, slightly overlapping ends, increasing in thickness from the end towards the middle. Child's ear-rings. Copper, circular shape slightly deformed. (Pl. 34:4).
∅ 1.4—1.6 cm, 1.3—1.5 cm, th. 0.2—0.4 cm.

14. **I 465** — I 465
a) Ring, of thick wire, children's bracelet. Copper. Disintegrated on being lifted. Dimensions not ascertained.
b) Object of indefinite shape. Copper, highly corroded surface. Disintegrated on being lifted. Dimensions not ascertained.

15. **J 1890** — J 1890
Small fragment of an indeterminate object. Copper. Disintegrated on being lifted. Dimensions not ascertained.

16. **J 1963** NpM P 5324 J 1963
a) Fragment of a small and thin ring, a child's ring or ear-ring- Copper.
∅ probably 1.5 cm, th. 0.2 cm, l. of fragment 1.2 cm.
b) Fragment of a larger thicker ring, a child's bracelet. Copper.
∅ not to be ascertained, th. 0.4 cm, l. of fragment 0.9 cm.
c) Tubular bead. Copper. Lost. Dimensions not ascertained.

17. **J 1970** NpM P 5326 J 1970
Ring of thick wire with open ends, a ring or ear-ring. Copper, thick layer of verdigris on the surface. (Pl. 34:5).
∅ 2.1 cm, th. 0.2 cm.

C) OBJECTS OF STONE

1. **F 131** EgM A 13
Crudely modelled headrest. Limestone, the section broadens conically from top to bottom. (Pl. 35:1)
L. 18 cm, h. 12.0 cm, th. at top 5.5 cm, th. at bottom 7 cm.

2. **F 415** NpM P 5278 I 415
Fragment of an arched convex object. Stone, covered with green faience.
2.2 × 2.2 cm, th. 0.6 cm.

D) OBJECTS OF WOOD

1. **F 134 A** — A 13
Fragment of wood from a coffin, partly covered with white plaster and yellow paint.
L. 5 cm, w. 4 cm, th. 0.5 cm.

2. **I 395** NpM P 5338 I 395
Solid wooden object of ashlar shape with a straight bottom and a convex upper surface. The low side walls are perpendicularily cut off. The longer has three slits, the shorter one slit for the insertion of a tenon. This is part of a larger object composed of parts linked by tenons, either a coffin or a piece of furniture. No traces of polychromy. (Pl. 19:3).
L. 24.7 cm, w. 9.9 cm, h. 4.5 cm.

3. **J 1606** NpM P 5339 J 1606
Wooden stick with a broad handle in two fragments. (Pl. 18:4).

4. Sine no. — A 42/1
Fragment of a wooden object shaped into a flat rod-shaped handle surrounding a flat oval aperture.
L. 9.5 cm.
Note. Shapeless fragments of wood from coffins found among lifted human bones were not recorded in detail; samples of these were used for xylotomic research (see. Chapt. 5).

E) LINEN WRAPPING AND OTHER OBJECTS

1. **A 6** NpM P 5446 A 6
Shred of densely woven linen, light brown in colour, most likely of the wrapping around the deceased.
L. 6 cm.

2. **A 13** NpM P 5447 a, b A 13
Two shreds of linen, one densely woven, light brown in colour, the other more loosely woven, ochre in colour.
a: 11 × 16 cm
b: 7 × 8 cm.

3. **A 15** NpM P 5448 A 15
A larger number of shreds of densely woven linen, ochre in colour. Placed side by side they cover an area of c. 35 by 90 cm.

4. **A 18** NpM P 5449 A 18
A large number of shreds of densely woven linen, light brown in colour. Placed side by side they cover an area c. 25 by 40 cm.

5. **A 36/7** NpM P 5450 A 36/7
Two larger shreds of densely woven linen, light brown in colour.
a: 16 × 23 cm,
b: 23 × 30 cm.
Note: Further small shreds of linen from burials A 1, A 2, A 10, D 123, D 130 a, I 405, I 411 (two samples) were not recorded in more detail; the samples were intended for textile research[35].
Histological note (A. Němečková). In the sample from deposit A 36/12 we were unable to determine the kind of human tissue. We discovered, however, fibres which originate in wrappings (Pl. 35:3). Their structure corresponds to linen fibres. Very well apparent are transverse links in uneven distances (Pl. 35:4).

F) WICKERWORK

1. **A 6** NpM P 5451 A 6
Three pieces of string twisted of two strands of palm fibre and a little fan made of a bunch of palm fibres.
L. a: 12 cm, b: 5,5 cm, c: 4 cm, d: 8,7 cm.

2. **A 12** NpM P 5452 A 6
Thick rope of three strands of palm fibres. (Pl. 19:5).
L. 25 cm, the. 4.5 cm.

3. **A 13** NpM P 5453 A 13
A piece of string of three strands of twisted palm fibres and a little fan made of a bunch of palm fibres. (Pl. 19:6).
L. a: 18 cm, b: 13 cm.
Note: Further small fragments of string, with which the deceased were probably bound, were found often among the bones of several burials without being recorded in more detail.

G) VARIOUS

1. **F 167** NpM P 5455 A 12
Incomplete shell of the mussel Aspatharia (Spathopsis) arcuata (Caill. 1923) of the Mutelidae family[34]. (Pl. 35:2).
L. 7.8 cm.

2. **A 22** NpM P 5456 a, b
Fragments of the shell of the mussel Aspatharia (Spathopsis) arcuata (Caill., 1923) of the Mutelidae family[34].
L. a: 7 cm, b: 6.4 cm.

3. **I 415** NpM P 5278
Fragment of an arched convex stone object with a green faience glaze.
2.2 × 2.2 cm, th. 0.6 cm.

4. **J 1889** NpM P 5253
Marginal fragment of a low glass dish of a open angulated shape with a thickened oval edge. Non-transparent, translucent, blue glass. Strip below the edge, edge and strip below the angulation red. (Pl. 19:7).
7.2 × 2.1 cm, th. 0.1 cm, th. of edge 0.4 cm, reconstructed diameter of the edge 12 cm.

H) POTTERY

All finds of pottery connected with the deposits and the burials were dealt with by CHARVÁT (1981).

35 The results were not submitted because of the death of the specialist, Ing. J. Jankovský.

34 See p. 56!

CHAPTER 5

XYLOTOMIC ANALYSIS

(D. BŘEZINOVÁ AND B. HURDA)

A) METHODOLOGY AND RESULTS

In the years 1979—80 we carried out xylotomic analysis of a set of fragments of wooden coffins of the secondary burials in the Mastaba of Ptahshepses at Abusir (n = 33) and five other wooden objects found in the Mastaba and in its vicinity.

The determination of the botanical types of wood was carried out by microscopic study of the structure of the wood with the aid of comparative preparations and on the basis of available literature (BAYER 1937, BÄRNER 1942, HOWARD 1942, NORMAND 1950, HUBER and ROUSCHAL 1954, GREGUSS 1955, BRAZIER and FRANKLIN 1961, ROULEAU 1970).

The results of the determination of the individual samples are compiled in table 5:1. In the case of samples coming with certainty or great likelihood from wooden coffins the following kinds of wood were ascertained: 51,5 % Ficus (sycomorus), 36,4 % Acacia (arabica), 6,1 % Phoenix dactylifera, 3 % Cedrus libani and 3 % Zizyphus spina christi (Fig. 5:1). In the case of the other five objects twice there was Cedrus libani and once Acacia sp., Phoenix dactylifera and an undetermined[36] deciduous wood.

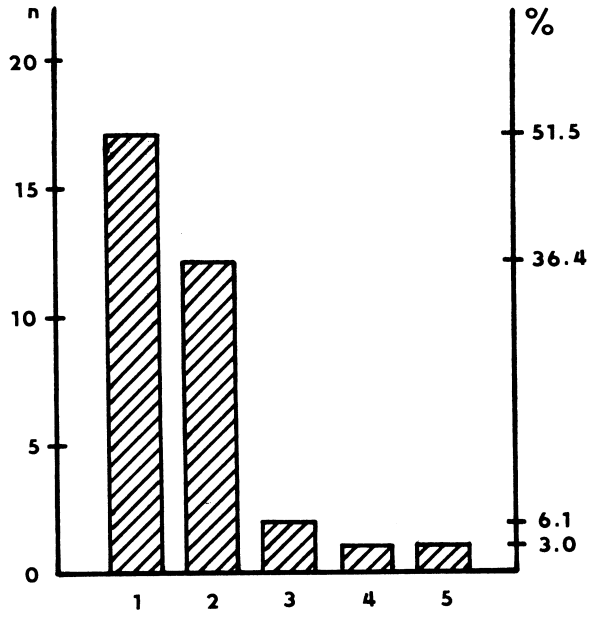


Fig. 5:1 Kind of Wood Used for Coffins at Abusir
1 = Ficus sycomorus
2 = Acacia arabica
3 = Phoenix dactylifera
4 = Cedrus libani
5 = Zizyphus spina christi

B) SYSTEMATIC DESCRIPTION

Family: MIMOSACEAE: Acacia sp. (Acacia arabica Willd.) (Pl. 36: 1—3).

The majority of these trees are small to medium-sized, 10 to 15 m high, with a trunk 40 to 60 cm in diameter. The heartwood and the sapwood are clearly distinguished in colour. The sapwood is yellowish-white and the heartwood, when fresh, is reddish to light red, but, in time, the colour changes to dark red and even red-brown. Often it has decorative darker strips running irregularly. The wood is diffuse porous with medium-large and oval pores. The vessels have simple perforations and the pits of the vessels have decorative pore apertures. They contain a great deal of brown coloured organic matter. The longitudinal parenchyma is paratracheal. The rays are barely visible with the naked eye; they are numerous, usually single layered, but even in 4—10 layers and homogeneous. In the longitudinal parenchyma are numerous chains of rhomboidal crystals, which are sometimes even in the idioblasts. The structure of the wood is straight-grained and rough. The wood is heavy, hard, resilient and elastic. It is durable and impregnates well. Despits its hardness it can be easily worked even with hand tools, especially in the fresh state.

Family MORACEAE: Ficus sp. (Ficus sycomorus L.) (Pl. 36: 4—6, 37:1)

This kind of trees are medium large, reaching a height of up to 15 m, with a diameter of the trunk up to 100 cm. The heartwood and sapwood barely differ in colour. The wood is dark-yellow with numerous brown pits which gives it a very interesting pattern. The broad rays form brownish mirrors. The wood is diffuse porous with large round to oval pores. The vessels have simple perforation, an abundance of pits and are often filled with tylosis. The fibres are thin-walled, broad and short. The longitudinal parenchyma are plentiful, mainly paratracheal, in bundles. The rays are

36 Its strongly disintegrated state did not make identification possible.

4—10 layers wide, more than 0.5 mm high and heterogeneous. In the parenchymatic cells both of the rays and the longitudinal parenchyma there mostly are numerous individual rhomboidal crystals. Comparatively narrow latex canals can be found in part of the biseriate rays. The wood is very hard, dense, strong, entirely resistant to climatic influences, and durable. Yet it can be fairly easily worked even with hand tools.

Family PALMACEAE: Phoenix dactylifera L. (Pl. 37: 2—4)

Trees of this kind reach a height between 10 and 30 m and a diameter up to 100 cm. The wood is almost white to yellowish-grey. It is coarser and unevenly dense. It is composed of parenchymatic ground tissue, in which there run very numerous, often arched and crossing vascular bundles and sometimes isolated strips of sklerenchymatic tissue. Each vascular bundle is surrounded by a sheath of darker sclerenchymatic tissue, which forms an ornamental pattern in cross-section. Inside the bundle it usually has two larger vessels, which have scalariform perforation and spiral thickenings similar to the rest of the vessels. Stegmata are to be found in the longitudinal parenchyma. The wood is medium heavy, fairly hard, strong and resilient. It is considered durable wood but is somewhat more difficult to work.

Family PINACEAE: Cedrus libani Barr. (Pl. 37: 5—6)

Trees of this kind reach a height of up to 40 m, and the diameter of the trunk can be more than 300 cm. The heartwood and the sapwood are clearly distinguished in colour. The sapwood is pale yellow to grey-white, while the heartwood is red-brown to dark brown. The rings are dense but visible. The structure is straight-fibred, soft and even. The wood has a strong scent. The rays are single-layered, occasionally double-layered and have transverse tracheid with smooth walls along the edge. The longitudinal tracheid have double pits with fine lobed scalloping around the pores. The longitudinal parenchyma is to be found only along the edge of the annual rings. In the heartwood there are parenchymatic cells filled with resin. There are practically no resin canals. The wood is light, firm, dense and tough. It is hightly durable and can be easily worked with hand tools.

Family RAMNACEAE: Zizyphus spina christi

This is mostly a shrub or small tree. The wood is yellow to brownish, of good quality. It is porous in places with round or oval pores, the vessels have thick cell membranes with simple perforation and are greatly pitted. The wood fibre is similarly thick-walled. The longitudinal parenchyma are paratracheal, basicentric to marginal. The single-layered vascular bundles with strikingly short cells of almost square shape are distinctly tall. In the longitudinal parenchyma there are rhomboidal calcium oxalate crystals. The cells of the vascular bundles contain a brown coloured organic matter. The wood of Zizyphus spina christi, despite its small size, is valued and used in artistic cabinet-making.

DICOTYLEDONES: Deciduous wood not determined more closely

In comparison with other kinds of woods it has a barely visible growth zone (layers), in the cross-section it is distinguished by its pores, for, with rare exceptions, it always has vessels. Mostly it has striking rays. As a whole, its structure is far more complex than that of coniferous wood. In our case we were dealing with badly disintegrated wood, which could not be identified more closely.

C) PRESERVATION OF WOOD

Part of the analysed samples of wood could be determined only by family in view of the considerable destruction of cell walls conditioned, to a large extent, by saprophyte fungi. In macroscopic and microscopic research destruction was ascertained even on durable and resistant woods. Strong decay of cell walls was found on e. g. Cedrus libani (sample 23), while the wood of Phoenix dactylifera (samples 10, 11, 20) proved to be in a good state of preservation of the cell tissue.

In the case of a number of samples of acacia and ficus numerous remnants of hyphae were found, marks that prove the activity of saprophyte fungi. On the basis of xylotomic analysis alone it is not possible to state whether the wood was attacked or broken down by saprophyte fungi before it was worked or during the subsequent phase — after deposition of the burial. But we are of the opinion that durable wood was used and that the destruction occurred secondarily during the time that passed between the depositon of the burial and the present.

D) COMPARISON OF RESULTS WITH OTHER SETS

The results of the determination of kinds of wood of the coffins of the secondary burials at the Mastaba of Ptahshepses at Abusir are compared on table 5:2 with frequencies of kinds of wood used for coffins in the Czechoslovak Collections (BŘEZINOVÁ and HURDA 1976) and with the frequencies of kinds of woods found in a set of wooden objects in the cemeteries at Wadi Qitna and Kalabsha in Egyptian Nubia (BŘEZINOVÁ and HURDA 1984).

In both sets of coffins, at Abusir and the set of Egyptian coffins in the Czechoslovak Collections, the most frequent material used is the wood of the ficus, but the two sets differ in its frequency, which is smaller at Abusir than in the other Egyptian coffins. On the other hand, the wood of the acacia was used far more often for the Abusir coffins than the other Egyptian ones. Date-palm and cedar are represented more sporadically in the Abusir set, tamarisk was absent and, in addition, zizyphus appeared. With the exception of cedar imported from Lebanon local Egyptian woods were used for both sets of coffins. At the cemetery at Abusir the most frequently used wood were common, easily accessible and cheap kinds, which corresponds to the archeological character of the burials revealing little affluence and a lower social status of the members of the Abusir community.

In comparison with the two sets of wood from the coffins the frequency of wood of objects found at the Nubian cemetery differs even more distinctly. Here acacia predominates, the fig-tree is less often present and in comparison with the sets of coffins the zizyphus attains comparatively large frequency, the tamarisk, on the other hand, very low frequency. The differences result mainly from the character of the objects — on the one hand, coffins, on the other, funeral beds and small objects of the equipment — but this, simultaneously, reflects a certain diverging accessibility of individual kinds of wood in Nubia compared with Egypt.

The five other objects from Abusir are characterized by the appearance of cedar beside local Egyptian kinds and an enigmatic kind of deciduous wood.

There exist numerous data in older and new literature on the use of the kinds of wood cited in ancient Egypt (DISCORIDES, HERODOTUS, PLINIUS, STRABO, THEOPHRASTUS, BAYER 1937, HUBER and ROUSCHAL 1954, LUCAS and HARRIS 1962, BŘEZINOVÁ and HURDA 1976). The results of our xylotomic analysis confirm and complete the list of woods used by the ancient Egyptians in the production of coffins and other objects.

DATING

A) RADIOCARBON DATING

J. ŠILAR

Of the six samples of organic material from the secondary cemetery in the Mastaba of Ptahshepses at Abusir near Cairo supplied to our laboratory in 1979 and 1982 for radiocarbon dating, it was possible to process, measure and evalue 3 samples. They comprised a sample of linen from burial A 15 (Náprstek Museum No. P 5448) and two samples of wood from the coffins of burials J 1555 and J 1628. The other samples were too small for processing.

Herewith we present the results of measuring radiocarbon activity of the three samples processed, and the results of the calculation of radiocarbon age, which are dendrochronologically corrected.

The samples were chemically processed in the standard method, i. e. they were mechanically cleaned, alternatively boiled in hydrochloric acid and sodium hydroxide, washed, dried and burnt in a stream of oxygen to carbon dioxide. This was repeatedly cleaned by freezing and chemically and then filled into the proportional counter with an effective volume of 727 ml under a pressure of 0.25 MPa. The results of measuring radiocarbon activity are related to the world standard activity of the modern sample, which is 0.95 % of the activity of oxalic acid N.B.S.

The results of measurement are converted to radiocarbon age in the standard manner (LIBBY 1952) assuming a half-life of 5568 ± 30 years according to the resolutions of the Eighth International Conference on Radiocarbon Dating (Proceedings of the 8th International Conference on Radiocarbon Dating 1972).

The results of the measurements and calculations of age are given on table 6:1. The results are expressed in years B. P., i. e. before the year 1950 and adjusted to the conventional era. In the usual manner the ages are expressed with a precision of one standard deviation (1 σ), so that the real age lies within the range of the calculated age $\pm 1\ \sigma$ with a probability of 68 %, i. e. roughly 2:3.

Radiocarbon activity related to the modern world standard activity is given in column 5, radiocarbon age with the relevant standard deviation[37] for the half-life $T_{1/2} = 5568 \pm 30$ years in column 6 and for $T_{1/2} = 5730 \pm 40$ years in column 7. The influence of the fluctuations of radiocarbon activity in the past on the results of dating is dendrochronologically corrected. The period of the origin of the samples corrected according to the tables of DAMON, LONG and WALLICK (1972) is given in column 8 and according to the tables of MICHAEL and RALPH (1972) in column 9. Column 1 gives the number of the measurement including the code of the radiocarbon dating laboratory of the Faculty of Natural Sciences of Charles University, which has to be given in quoting the results.

The following radiocarbon age[38] for $T_{1/2} = 5568 \pm 30$ years can be deduced from the measurements:

Sample	Burial	Radiocarbon age
CU 413	J 1628	2361 ± 166 years B. P.
CU 414	J 1555	2071 ± 158 years B. P.
CU 437	A 15	2488 ± 147 years B. P.[39]

In a statistical comparison of the results of radiocarbon dating two samples can be regarded as of equal age, if they fulfil the criterion $\Delta_A \leqslant 2\sigma_{Ai}$, where Δ_A is the differences in age of the two samples compared and σ_{Ai} is the standard deviation of this difference calculated from the standard deviation of the two ages compared.

According to these criteria the sample of linen from burial A 15, situated inside the Mastaba (CU 437 measurement) can be regarded as of equal age as the samples of wood of burial J 1628 (CU 413 measurement) and J 1555 (CU 414 measurement) situated around the Mastaba.

The mean age of samples from burials A 15, J 1628 and J 1555 calculated from the results of measurements CU 437, CU 413 and CU 414 as weighted means and considering standard deviations can be expressed as follows:

37 Radiocarbon dating is given before the present (B. P.), referring to the year 1950.

38 The calculated radiocarbon age or time of origin are not rounded off, since they are the result of computation and are used for further calculations.

39 A reliable measurement of a standard pattern from an earlier period was used for the calculations of radiocarbon age measuring CU 437. The statistics of the measurements reveal that any new measuring of linen P 5448 and of the standard sample will show different results, but it is likely that these results will not exceed the calculated standard deviation. It is, therefore, unlikely that new measurements would change the results and conclusions of completed measurements.

1. Mean uncorrected radiocarbon age
   a) for the half-life $T_{1/2}$ = 5568 ± 30 years:
      $\overline{A} \pm \sigma_{\overline{A}}$ ..... 2314 ± 90 years B. P.
   b) for the half-life $T_{1/2}$ = 5730 ± 40 years:
      $\overline{A} \pm \sigma_{\overline{A}}$ ..... 2388 ± 92 years B. P.
2. Mean radiocarbon age and mean time of origin of the samples after dendrochronological correction
   a) according to the correction tables by DAMON et al (1972):
      $\overline{A}$ corr ± $\sigma_{\overline{A}\text{ corr.}}$ ..... 2413 ± 100 years B. P.
      the time of origin ..... 463 ± 100 years B. C.
   b) according to the correction tables by MICHAEL and RALPH (1972):
      $\overline{A}$ corr ± $\sigma_{\overline{A}\text{ corr.}}$ ..... 2390 ± years B. P.
      the time of origin ..... 420 ± 100 years B. C.

B) RELATIVE DATING BY THE FLUORIDE METHOD

(J. ČEJKA, Z. URBANEC AND I. ČEJKOVÁ)

The dating of both parts of the cemetery by the radiocarbon ($^{14}_{6}$ C) method showed that they were roughly contemporaneous. Systematic differences in the weight of the long bones of the extremities — smaller in the second series (around the Mastaba) and larger in the first series (inside the Mastaba) (Chapter 10, sub B) — however roused suspicion whether these were not the results of chronological differences, i. e. different length of time in which the two series were buried in the ground.

Fluoride tests were used to check the relative chronological relations of the two series. The determination the fluoride content in the bones was carried out by means of a ion selective fluoride electrode OP F 7111 D on the Radelkis Fluoridometer OP 108, using a method elaborated by SINGER and ARMSTRONG (1968). Principle of the method: A sample of bone is ashed at a temperature of cca 550 °C for a period of 6 hours and dissolved in 5 ml of 1M HCl. The resultant solution is neutralized with 5.5 ml 0.5 M NaOH and diluted to the volume of 25 ml with distilled water. After the addition of a buffer solution TISAB (at a ratio of 1:1 of the volume), three estimations of the content of fluoride ions were carried out for each sample at a temperature at which the apparatus was calibrated with a standard NaF solution of a concentration close to the stipulated one or that to be expected. At the same time the mass decrease at 110 °C (humidity) and 180 °C (humidity, bonded water) and at 550 °C (humidity, bonded water, organic phase) and density (pycnometer, water) was determined. In both series, an analysis of random samples was carried out, 13 from the first series (inside the Mastaba) and 13 samples from the second series (around the Mastaba).

The results of the measurements are given on table 6:2. The first column shows the number of the samples corresponding to the numbers of the anthropologically defined individuals, the second column gives their ages, the third — the sex, the fourth column shows the fluoride content in percentages of mass, the fifth column gives the density and the sixth — the mass decrease at 110, 180 and 550 °C.

The fluoride content in the first series ranges from 0.05—0.22 mass %, in the second from 0.03—0.23 mass %. The mean value of fluoride content in the first series is $\overline{x}$ = 0.14 mass %, s = 0.06 mass %, in the second series $\overline{x}$ = 0.11 mass %, s = 0.06 mass %. From the comparison of the range of fluoride content in the two series and the insignificance of the differences in mean and variability of the two series in t- and F-tests, it can be deduced that the bone samples under study come from the same period of time, which is in correspondence with the results of radiocarbon dating.

In the individual values, one can likewise observe a rise in the fluoride content with advancing individual age. This fact, which corresponds to data given by GABOVICH (1950) and by JACKSON and WEIDMANN (1958) is now being tested on a larger series of individuals and will be included in a special report. To exclude the factor of age differences, we have compared the values of adults separately. They amount to $\overline{x}$ = 0.17 mass %, s = 0.04 mass % in the case of 9 samples of the first series, and $\overline{x}$ = 0.14 mass %, s = 0.05 mass % in the case of 8 samples of the second series. The mean and the variability of samples of the two series are not different also in this comparison. Individual values likewise confirmed the well-known differences in the fluoride content in compact (lower) and in spongy bone (higher), quoted in literature.

The water content in the bones was ascertained by drying at 110 and 180 °C; these temperatures were chosen with regard to the data published by KISZELY and DAVID (1969).

At the temperature of 110 °C the mass decrease amounted to x = 5.76 mass %, s = 1.13 mass % in the first series, and it was slightly higher in the second series x = 7.62 mass %, s = 1.06 mass %. This decrease corresponds to the humidity. At the temperature of 180 °C the decrease amounted to $\overline{x}$ = 7.12 mass %, s = 1.36 mass % for the first series, and was again slightly higher for the second series, $\overline{x}$ = 9.06 mass %, s = 1.15 mass %. In this case, apart from humidity, it was a matter of bonded water. At the temperature of 550 °C, however, the decrease amounted to $\overline{x}$ = 22.35 mass %, s = 7.80 mass % in the first series, while in the second series to only $\overline{x}$ = 15.0 mass %, s = 1.74 mass %. This decrease comprises all organic components of the bone apart from the overall quantity of water. It can, therefore, be stated that the organic component was greater in the first as compared with the second series.

Closely connected with this, it is the density of the samples under study. The higher the loss by ignition (550 °C), the lower is the density of the bones and vice versa. This corresponds to the relatively high content of organic matter in the bones inside the Mastaba. The higher gross density of the whole bones including the water and organic matter from the inside the Mastaba is clearly caused by this high content of the organic phase in contrast to the bones from around the Mastaba, in which the content of the organic phase is considerably lower. In other series from the region of Abusir and Saqqara similar gross density was found as in the first series (from inside the Mastaba).

The differences discovered can by explained by the hy-

pothesis that the rate of posthumous decomposition was quicker in the case of the individuals lying in the sand around the Mastaba as a result of their greater exposure to the sudden changes in the short periods of high humidity and long periods of extreme drought, which caused a considerably greater reduction in the content of organic matter. The bones placed inside the Mastaba retained a lower grade of humidity as a result of being placed inside the individual rooms of the Mastaba, however much ruined or disturbed. Therefore, the disintegration of the organic components of the bones took place at a slower rate inside the Mastaba than outside it. The very close (practically identical) ratio of fluoride ion in both series, on the other hand, indicates that these differences were not, in great probability, caused by a chronological factor and that both series are contemporaneous.

C) CONFRONTATION OF DATING

The coffins of the burials around the Mastaba can mostly be dated into the sixth to the firth century B. C. A few of them are probably a little younger, coming from the Roman period (Chapter 3, sub F).

The pottery storage jars, in which the remains of babies had been placed (I 347/1, J 394), are given by CHARVÁT (1981: 159, 162, 198) in his monography on the pottery of the Mastaba of Ptahshepses as typical Saitic storage jars, which corresponds to the period from 664 to 525 B. C.

Among other pottery finds that might be connected with the burials, CHARVÁT (1981: 156) dates bottle I 405 to the period 610—575 B. C. The vessels I 387 and J 1894 are considered approximately as products of the second half of the first millenium B. C. (CHARVÁT 1981: 157).

In connection with skeleton finds A 18, A 20, A 22, A 36/5 and A 38 typical sherds of Bes jars were unearthed, which CHARVÁT (1981: 156—7) dates, with great probability, likewise to the Saitic period.

The other objects of the burial equipment cannot be dated with greater precision, but in approximation, they correspond fully to the dating into the middle and last third of the first millenium B. C.

According to stratigraphic observation in the area of the south-eastern storerooms, the burials deposited there come from the period after the New Kingdom (CHARVÁT 1981: 193). Some burials in the area around the Mastaba were covered with broken stonemasons' platforms dated, roughly according to the pottery, into the Late Roman to Coptic period (CHARVÁT 1981: 196). The stratigraphy, in other words, delimits the period of existence of the cemetery into the first millenium B. C. with a possible overlap into the early Roman period.

Radiocarbon dating (this chapter, sub A) is in full accord with the archaeological dating. If we take into account the mean values calculated for the time of origin of the three samples with the standard deviation and dendrochronological adjustment according to the two methods used, we attain a range from the 6th to the 4th century B. C. If we take the time of origin of individual samples determined in similar manner, we get the span of time from the 9th to the early 5th century B. C. for sample A 15, the 7th—4th century B. C. for sample J 1628, and the 4th century B. C. to the early 1st cent. A. D. for sample J 1555.

We may sum up that the cemetery inside and around the ruined Mastaba of Ptahshepses was used between the 7th cent. B. C. and the 1 st cent. A. D. At the same time, the character of the archeological material, the results of radiocarbon dating and the relative dating by the fluoride method suggest the chronological contemporaneity of both parts of the cemetery.[40]

40 For methodological reasons attention was paid in the subsequent chapters to the possibility of differences or identities between the 1st series (from inside the Mastaba) and the 2nd series (outside the Mastaba).

CHAPTER 7

DEMOGRAPHY

A) STATE OF PRESERVATION AND METHOD OF STUDY OF THE MATERIAL

The anthropological material from the secondary cemetery in the area of the Mastaba of Ptahshepses comprises two series according to the location in which each was found, the state of preservation and the methods of study used; one series inside the Mastaba, the other in the area around the Mastaba.

In the area of the Initial Mastaba (burials marked A 1—A 46) human skeletal remains were found not in the form of burials but in smaller or larger piles of displaced and completely mixed-up bones, usually of a larger number of individuals. With a few exceptions it was not possible to carry out an anatomical restitution of the skeletons of individual persons. Even though the archeological findings scattered among the bones were of the same kind as in the ritually deposited burials around the Mastaba, it proved impossible to decide unequivocally whether we were dealing with burials that were later mixed up by repeated interference on the part of grave robbers and quarrymen, or with the skeletonized content of graves from some other, unknown site in the vicinity, cast secondarily into suitable places in the ruins of the Mastaba.

Likewise the method of study of this confused and mixed-up material differed from the study of individual burials around the Mastaba. It was performed as the analysis of individual parts of the skeleton in their anatomical sequence without regard to individual appurtenance.

To this material were added the remains of 8 individuals found in other rooms inside the Mastaba. These included two isolated skulls (A 48, A 49) found in the area set aside for deposition of the burial ships (marked H), and six burials in the area of the southern storerooms (marked D). One of these lacked a skull (D 123), one had no postcranial skeleton with the exception of an isolated metatarsal (D 84), in the case of three, only the lower jaw survived of the skull (D 125, D 130a, D 130b), and in one case only was the skeleton complete (D 135).

The second series was made up of human skeletal remains from the ritually deposited burials around the Mastaba (marked I, J and, in the case of some burials by the south-eastern corner of the Mastaba, D, according to the adjacent inner room). In most cases the complete or almost the complete skeleton survived. Skulls were missing in the burials, probably as a consequence of subsequent interference (I 293, I 397, I 407/2, I 418, I 439, I 445, I 454, I 462, J 1555, J 1885). The postcranial skeleton did not survive in 3 burials (I 294/2, I 382/2, D 226a) and only isolated postcranial bones remained in 4 other burials (I 273, I 380/2, I 454, D 226b). No traces of skeletal material were found in burial I 457, only a fragment of the top of the skull was found in burial J 354, and this disintegrated on manipulation; the bone material in graved D 335 was not taken out for technical reasons.

To determine age and sex, standard anthropological criteria were used, described in detail in the publication by STROUHAL and JUNGWIRTH (1984). The determination of age of the skulls in both series was based primarily on the closure of synchondrosis sphenoccipitalis and the individual skull sutures, evaluated from both the inner and outer sides, the eruption and abrasion of individual teeth, changes on the pars alveolaris of the jaw and the possible incidence of changes connected with ageing. The determination of sex was based on secondary sexual characters of the skull, including the mandible.

The postcranial skeleton gave precision to the determination of age and sex of individuals of the second series (from the area around the Mastaba). Age was assessed on the basis of the coalescence of the epiphyses and apophyses with the diaphyses of the long bones of the extremities, with the vertebral bodies, the changes on the facies symphysialis of the pubic bones, with regard to morphological changes in the proximal ends of the humeri and femora and other changes that occur in the course of ageing. An additional guideline was provided by the degree of spondylosis of the vertebrae. Secondary sexual characters of the pelvis and morphological and metric characters of the long bones of the extremities were used to determine sex.

Growth curves, constructed on the basis of the length of the diaphyses of individual bones of persons in the second series (see chapter 13) were used to determine the approximate age of isolated long bones of immature individuals in the first series (from inside the Mastaba). In the case of incomplete bones where it was not possible to determine the length of the diaphyses, the classification in age groups (0, 0—1, 1—2 years and subsequently in two-years units) was carried out by means of the size of the circumference on the basis of its variability, found out for individual age

groups in the second series. For bones with completed growth adult age was indicated without the possibility of closer determination of age. In the case of these bones sex was determined on the basis of ranges of dimensions of the relevant bones of either males or females determined for the second series (for details see Chapter 12). Bones whose dimensions fell into zones common for both sexes were attributed by random selection to one or other sex.

B) INDIVIDUAL DEMOGRAPHIC DATA

Individual demographic data (age and sex) determined for the first series (from inside the Mastaba) on the basis of skulls and isolated mandibles are summarized on table 7:1, arranged according to the sequence of the numbers of the burials.

Individual demographic data determined for the second series (for the area around the Mastaba) according to the surviving parts of whole skeletons, are given on table 7:2, likewise in the sequence of the numbers of the burials.

C) DETERMINATION OF THE TOTAL NUMBER OF BURIED PERSONS

The minimum number of individual of the first series (from inside the Mastaba) can be assessed according to the number of preserved isolated individual parts of skeletons with regard to their basic age and sex classification (tab. 7:3). Pairs of bones of the same piles (and occasionally from adjacent ones) might sometimes have been linked on the basis of morphological and metric similarity. The highest numbers were ascertained in the case of skulls and mandibles (176), femora (175) and pelves (160); there were fewer tibiae (147) and humeri (142), the smallest number being that of radii (110), ulnae (96), claviculae (82) and fibulae (80). If we pay regard to age, we can observe, in the case of the femora, which in number come closest to the skulls with mandibles, the absence of the category of juveniles and, on the other hand, a slight increase in the representation of children and adults. It is our opinion that the age determination is more correct in the case of skulls and mandibles and that some femora considered to belong to older children and certain femora with completed epiphyseal union might belong to the category of juveniles. We consider the minimum number of individuals and their age and sex distribution to be most reliably assessed according to preserved skulls and mandibles.

The maximum number of individuals of the first series was determined structurally within the framework of 46 individuals piles of bones, taking into account the possibilities of bones being displaced to adjacent piles and with the addition of 8 individual burials. In the case of adult bones, attention was paid to a given sex, among immatures, to the approximate age. By theoretical linking of bones of the same sex and age a maximum number of 299 individuals were reconstructed (tab. 7:4).

The total number of individuals buried inside the Mastaba, therefore, ranged from 176 to 299, with the average of these two extreme values amounting to 237 persons.

In the area around the Mastaba, the remains of 120 persons were found, the great majority buried in defined individual graves (tab. 7:5).

If we add the average number of individuals of the first series (237), the number of individuals in the second series (120) and the burials with non-surviving remains or those that were not taken out of the tomb (3), we get a total number of 360 individuals. Theoretically it is possible to add 30—50 other individuals, probably buried in the area around the Mastaba in some small sectors that were not thoroughly excavated (cf. plan of the Mastaba). In other words, the cemetery must originally have contained some 400 persons.

D) RATIO OF THE NUMBER OF ADULTS TO IMMATURES

In the first series the ratio of the number of immatures to adults can be determined firstly for a minimum number of individuals on the basis of individual bones (tab. 7:3). Of the three parts of the skeleton that are represented in largest numbers the ratio of immatures (55.7 %) and adults (44.3 %) as to skulls and mandibles lies roughly between the ratio of immatures (53.7 %) and adults (46.3 %), with regard to femora and the ratio of immatures (58.1 %) and adults (41.9 %) in the preserved pelves.

In the case of bones that survived less often, the ratio shifts towards the adults, clearly as a consequence of the more frequent absence of the fragile bones of children.

In the reconstructed maximum number of individuals the ratio of immatures (55.5 %) and adults (44.5 %) was found to be virtually identical with the ratio ascertained for the minimum number of skulls and mandibles (tab. 7:4).

In the series from inside the Mastaba, therefore, a clear predominance of immatures over adults can be stated. But it is not as great as to correspond to the immense child mortality of the time. As will be shown below, the category of new-born babies and small infants is not sufficiently represented in the material as they must not always have been deposited in the cemetery.

This conclusion is likewise supported by the contrary ratio of immatures (40.8 %) to adults (59.2 %), found in the second series (tab. 7:5). In this part of the cemetery with mostly non-disturbed burials deposited in dry desert sand, one can practically exclude the influence of posthumous selection on the disapperance of the fragile bones of children.

In the two series as a whole (using the minimum number of individuals of the first series, determined by the number of skulls and mandibles) an almost balanced ratio between immatures (49.7 %) and adults (50.3 %) is reached.

E) RATIO OF THE NUMBER OF MALES TO FEMALES

In the first series the ratio of the number of males to females can likewise be ascertained for a minimum number of individuals according to individual bones (tab. 7:3). Of

the three numerically best preserved parts of the skeleton, in the skulls and mandibles adult males (64.1 %) dominate over females (35.9 %), the difference being smaller for the femora (63 % males and 37 % females) and pelves (59.7 % males and 40.3 % females). Of the numerically less frequent bones, we find a similar ratio for tibiae (62 % males and 38 % females), ulnae (60.4 % males and 39.6 % females) and humeri (57.4 % male and 42.6 % female). For the rest of the bones the predominance of the number of males over females is less striking or non-existent. For skulls and mandibles it was possible to determine sex even for juvenile remains so that there is a total of 52 males (62.7 %) against 31 females (37.5 %) with a masculinity index 1677.

A similar result, almost identical with the ratio determined for the pelvis, was ascertained for a maximum number of individuals (59.4 % males and 40.6 % females, tab. 7:4). It is possible that the dominance of males over females in the scattered material from inside the Mastaba might be attributed to posthumous selection. Female bones were probably less resistant than male to the interference of grave robbers and quarrymen, or the displacement of the bones.

On the other hand, in the second series females over 15 years (52.6 %) slightly predominated over males (47.4 %, tab. 7:5) with an index of masculinity of a mere 900. This result is closer to the natural ratio of the two sexes and indicates that in part of the undisturbed cemetery in the area around the Mastaba no posthumous selection took place.

In the two series as a whole (using the minimum number of individuals of the first series determined according to the skulls and mandibles) a not very large predominance in the number of males (55.3 %) over the number of females (44.7 %) can be stated. This is a result that is currently met with in series of anthropological material from excavations in various parts of the world.

In view of the approximate concord of the ratio of immatures to adults and the ratio of the number of males to females in determining the maximum number of individuals structurally and the minimum number of individuals on the basis of skulls and mandibles and because of the lack of more detailed demographic data for a number of individuals of the maximum number, reconstructed on the basis of isolated postcranial bones, further demographic assessment of the first series will be based on the minimum number determined on the basis of skulls and mandibles. They can be considered a representative pattern of the whole, originally slightly larger set.

F) MEAN AGE AT DEATH

A surprisingly low mean age at death was calculated in the first series as a result of the predominance of immatures: a mere 17.4 years (tab. 7:6). In the second series, with a dominance of adults, the average age was 22.6 year. In the total of all individuals of the cemetery the average age was 19.5 years, which is a conspicuously low value.

When we take into account the sexually determined individuals of 15 years and more, the mean age at death, in the first series, is strikingly higher for males (33.4 years) than for females (30.9 years). In the second series, the mean age of males (32.8 years) is almost identical with that of females (33.3 years). In the whole material, the two series together, the difference between the mean age of males (33.3 years) and females (32.3 years) amounts to one year.

The lower mean age at time of death in the case of females in comparison with males tends to be a current find of demographically "normal" palaeoanthropological series. It is explained by the earlier mortality of females as a result of complications threatening life, connected with their generative function.

G) CLASSIFICATION OF INDIVIDUALS BY AGE

The individuals of both series were ranged, on the basis of age determination, into age groups: from birth to 15 years in the case of children (tab. 7:7) and from 15 to 60 years in the case of adults (tab. 7:8).

The tables make a synchronisation of individuals of the same age possible and provide quick orientation on the place of each individual according to age and (in the case of adults) sex. The compilation of numbers of individuals in each age group (n) provided a basis for a more detailed evaluation of age distribution in the two series and the material as a whole (tab. 7:9 and 7:10).

H/ CHILD MORTALITY ACCORDING TO YEARS

The number of children arranged in yearly intervals on the basis of their age at death is given separately for the

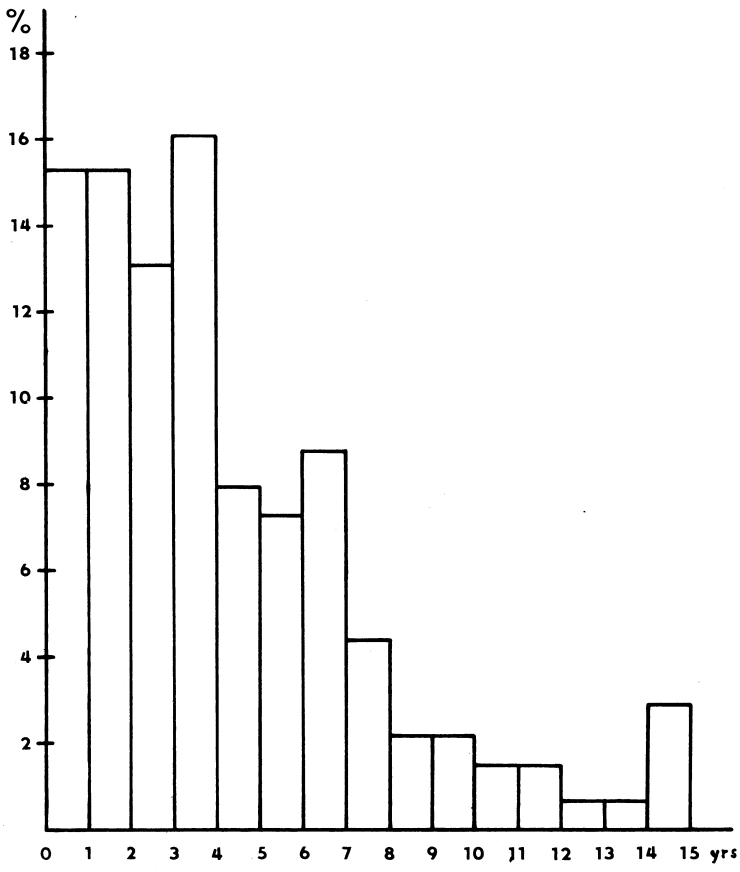


Fig. 7:1 Detailed Age Group Distribution of Children of the Combined Series

two series and for the whole material in tab. 7:9 and in graphic depiction for the whole material on fig. 7:1. The results correspond only to some extent to the expected hyperbolic mortality curve. There is the expected gradual decline from the highest point in the four first years to a minimum between the ages of 12 and 14. On the other hand, the similarity of the number of cases of the first four years is an anomaly. The normally several times higher representation of the age group 0—0.9 years, corresponding to the greatest threat to life at the time of birth and shortly after (perinatal mortality), is missing. Accordingly, within the first year there should be a complete prevalence of the first quarter year of life, which, however, — in both series combined — is represented by only 4 cases out of 21 (tab. 7:7). This proves that children that died at the earliest age were mostly not deposited in the cemetery under study or that their remains devoid of minerals disintegrated under posthumous influences. The representation of the second year and the decline in the third year correspond to reality. But there is a surprisingly higher share in the fourth year in comparison with the preceding and particularly the subsequent age groups. This was probably connected with the weaning of children which occurred in ancient Egypt at that period in view of the long period of nursing (3 years, STROUHAL 1977). Weaned children were exposed to the danger of alimentary infection during the transitional period from the mostly untainted nutrition by mother's milk to the highly contaminated food, which might well have proved fatal to certain children. A similar but less marked increase in the representation of the 7th year in comparison with the adjacent ones cannot be explained so easily and might be accidental. On the other hand, the increase in frequency of the 15th year as compared with the two preceding ones can be regarded as the beginning of a gradual rise in mortality at an early juvenile age.

I/ ADULT MORTALITY ACCORDING TO AGE GROUPS

The numbers of adult males and females arranged on the basis of their ages at the time of death at intervals of five years (from 15 to 29.9 years) and ten years (from 30 years upwards) is given for both series and for the whole material on tab. 7:9. The combined material is depicted graphically on fig. 7:2, on which, for better comparison, ten-year intervals were used (with the exception of the 15—19.9 year group). Both show that the largest number of individuals died in the age group 30—39 years (with the exception of males in the second series, which is probably accidental). In the case of males the group 40—49.9 years follows and closely behind it that of the 20—29.9 year old ones, while in the case of females the order is reversed and the difference more striking. There was a relatively low mortality rate in the case of juveniles (15—19.9 years) and a minimum one among the 50—59.9 year olds, and there was not a single individual over 60 years. The absence of older individuals, together with the relatively large representation of juveniles, is a basic characteristic of the combined series from Abusir. A comparison of the two sexes

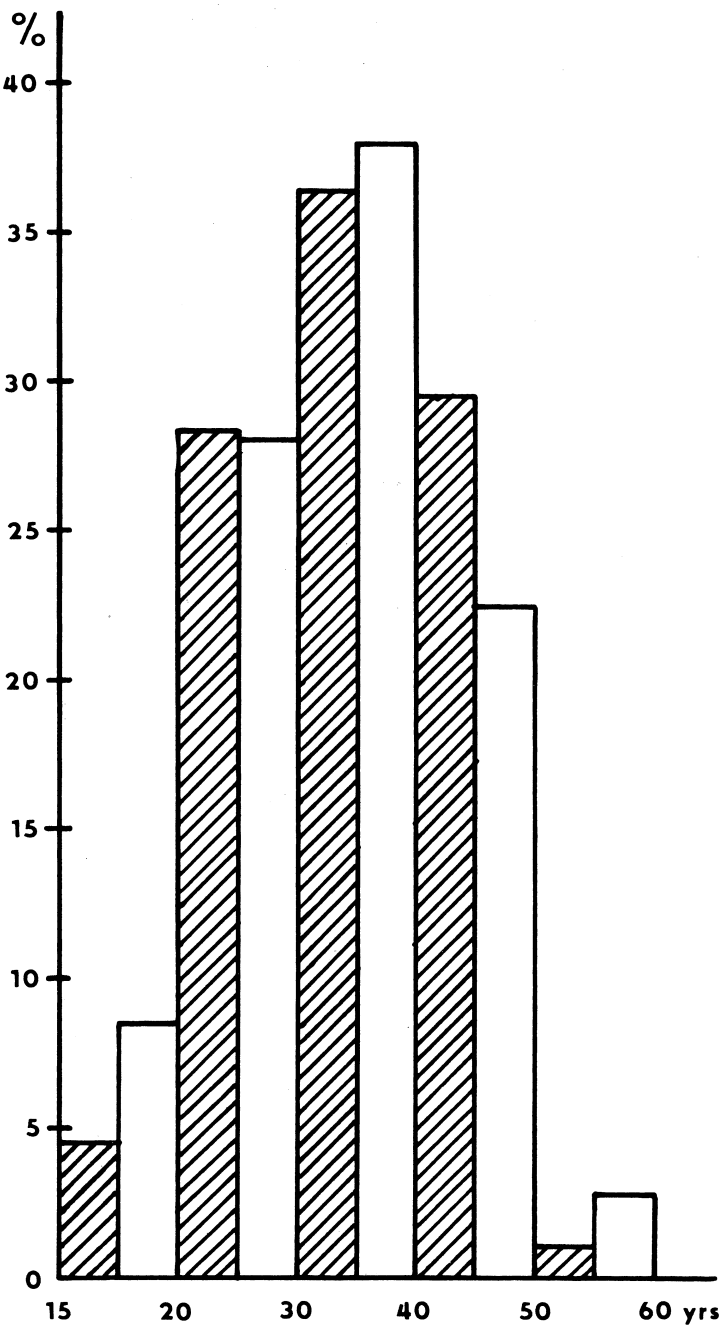


Fig. 7:2 Detailed Age Group Distributions of Juveniles and Adults of the Combined Series.

shows a greater representation of females in the youngest and the oldest age groups, an almost identical ratio of the two sexes among the 20—29.9 year olds, a slightly higher number of females among the 30—39.9 year olds, on the contrary, a predominance of males among the 40—49.9 year age group. These results (with the exception of the poorly represented oldest category) correspond to the assumed shift in mortality of females into the earlier age groups.

J) LIFE TABLES

The relative high number of individuals in the two series made it possible to construct life tables, which were worked out for the first series (tab. 7:11), the second series

(table 7:12) and the two series combined (tab. 7:13), as well as for males (tab. 7:14) and females of the two series combined (tab. 7:15). Generally all tables show the rapid decline in the number of survivors (1_x) in individual age categories, the high probability of death (q_x) of adults and the strikingly low life expectancy (e^0_x) of all age categories.

The graphic depiction provides a clear possibility of visual comparison of the differences between the two series in the most important parameters given on the tables. The decline in the number of survivors (1_x, fig. 7:3) does not occur in linear fashion, but in waves, with a rapid decline from birth to 10 years, a lessening of the decline up to 30 years and a new quicker drop after 30 years. At the same time a greater rate of decline in the number of survivors can be observed in the first series compared with the second, with a maximum difference among the 15—19 year olds.

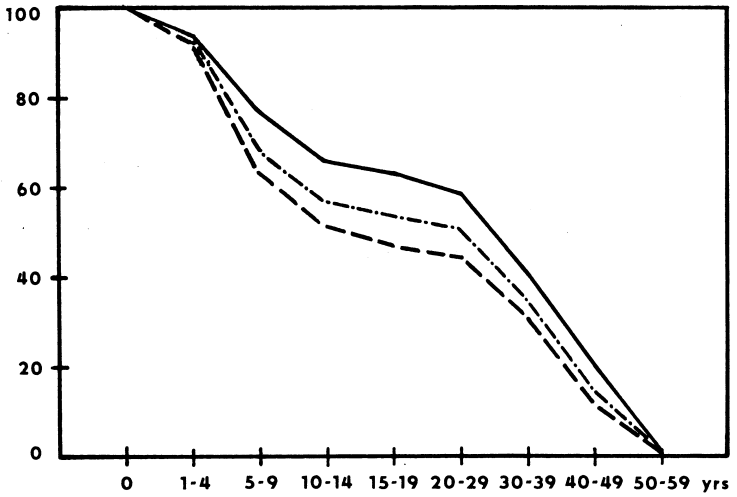


Fig. 7:3 Series Differences in Survivors Entering Age Intervals (1_x)
— — — — first series
———— second series
—·—·—· combined series

The probability of death (q_x, fig. 7:4) from birth to the interval of the 1—4 year olds rises steeply, later, on the contrary, it drops to the interval of the 10—14 year olds, then it goes up almost inappreciably to the 15—19 year olds, to rise practically in linear fashion in adulthood. In

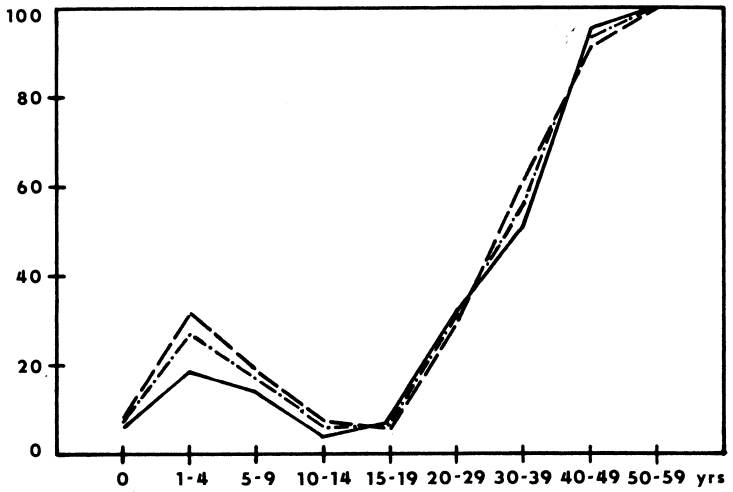


Fig. 7:4 Series Differences in Probability of Death (q_x)
— — — — first series
———— second series
—·—·—· combined series

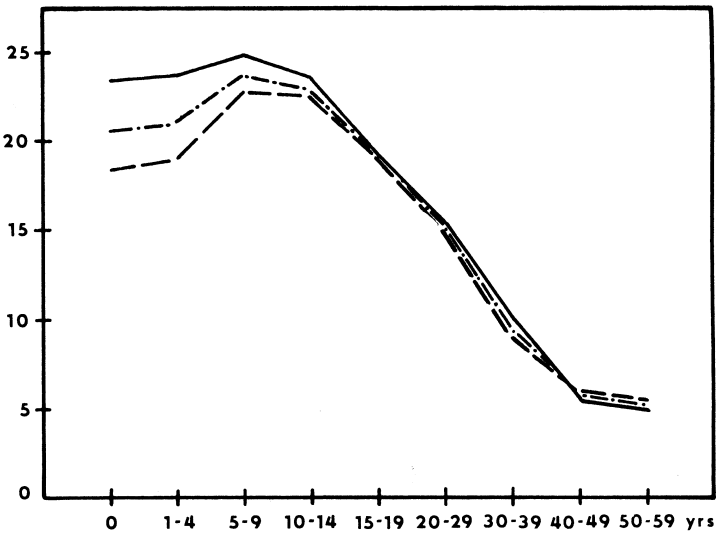


Fig. 7:5 Series Differences in Life Expectancy (e^0_x)
— — — — first series
———— second series
—·—·—· combined series

the first series compared with the second we can observe a greater probability of death at the immature age with the greatest differences among the 1—4 year olds.

Life expectancy (e^0_x, fig. 7:5) rises from birth, first slightly (as a result of the incomplete representation of the youngest age category, mentioned above), later, it rises to the category 5—9 years more strikingly, to decline gently to the 10—14 year category. Then we observe sharp regression to 40—49 years, followed by levelling out. The two series differ in this parameter in early childhood. The first series has a much shorter life expectancy than the second,

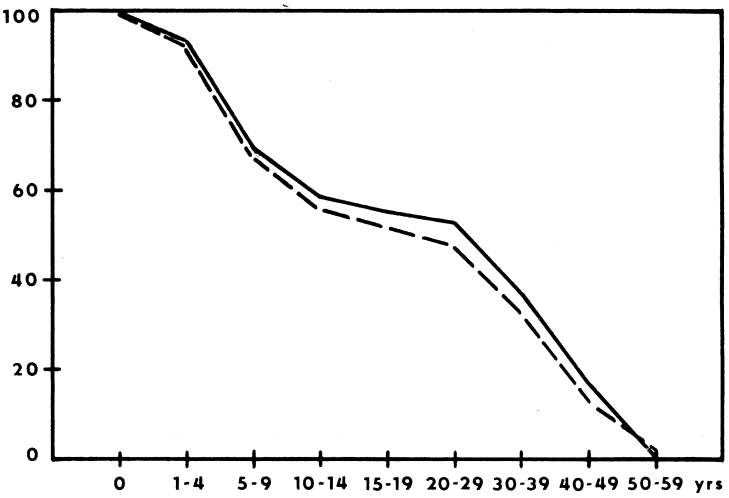


Fig. 7:6 Sex Differences of the Combined Series in Survivors Entering Age Intervals (1_x)
———— males
— — — — females

with a maximum difference in the category 0 and 1—4 years.

To sum up, the differences in the life tables of both series are mainly caused by the higher child mortality in the first compared with the second series.

A comparison of these parameters of life tables of both sexes[41] showed a greater rate of decline in the number of

41 In the case of children the division to males and females was carried out according to the customary demographic principles, i. e. at the age from 0 to 4.9 years at the ratio of 52.5:47.5 and at the age of 5 to 14.9 years at the ratio of 50:50.

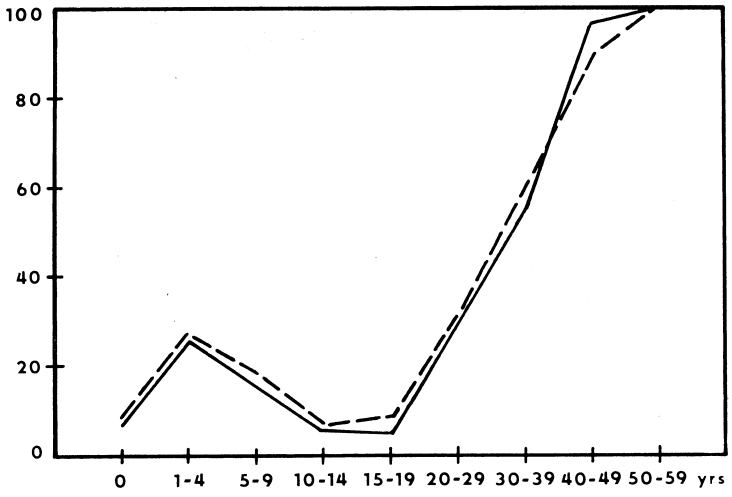


Fig. 7:7 Sex Differences of the Combined Series in Probability of Death (q_x)
———— males
– – – – females

survivors (1_x, fig. 7:6) for females compared with males, with a maximum difference among the 20—29 year olds.

In probability of death (q_x, fig. 7:7) females firstly exceed males with a maximum among the 15—19 year olds, later the difference decreases and around the 40th year the two curves cross as a result, by contrast, of the lower probability of death of females aged 40—49 in comparison with males of the same age.

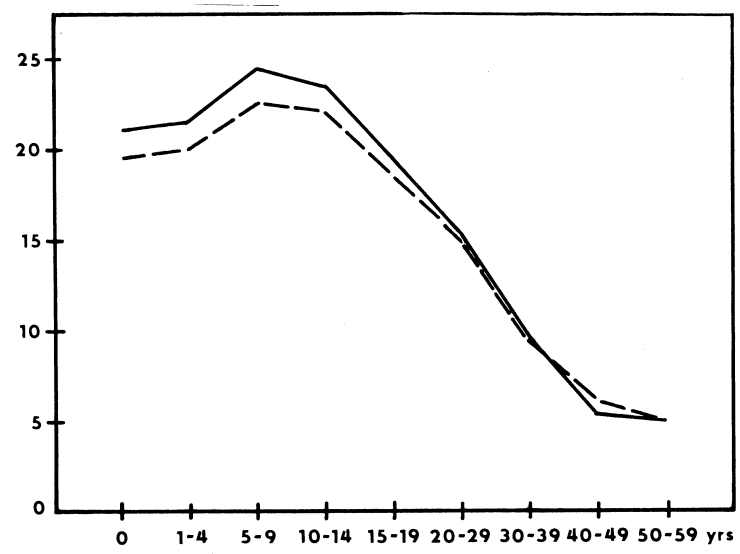


Fig. 7:8 Sex Differences of the Combined Series in Life Expectancy (e_x^0)
———— males
– – – – females

The curves of life expectancy (e_x^0, fig. 7:8) of both sexes run in similar manner. Females have a strikingly lower one in childhood, but later the difference lessens, and around 40 years the two curves cross as a result, on the contrary, of the slightly higher life expectancy of females aged 40—49 compared with males.

To sum up, differences were ascertained between the two sexes caused by the higher mortality rate of young females and the smaller mortality of older females in comparison with males of the same age. These differences are at the same time smaller that the differences found between the two series.

In conclusion, we give the gross mortality rate[42], which amounts to 54.3 persons in the first series, and 42.7 persons in the second series, making 49 persons in the two series combined — 47.4 persons in the case of males of the combined series, and 51.3 persons in females of the combined series. These are high values, and even extremely high ones in the first series and among females.

42 $M = \frac{1000}{e_0^0}$, where e_0^0 is the average life expectancy at birth.

CHAPTER 8

BURIAL RITES

A) PROTECTION OF THE BURIALS

Facts concerning the burial practices of the populations that deposited their dead in the ruined Mastaba of Ptahshepses and its vicinity could only be studied in the part of the cemetery around the Mastaba. Inside, there was complete confusion, scattering and mixing-up of human skeletal remains in almost every case.

The survivors' care for the deceased can be assessed primarily according to the manner of protection given to the body of the deceased (tab. 8:1). No special grave structures were built for these. In roughly half of all the cases perfect protection was provided by a wooden (on a rare occasion clay) coffin. We can observe considerable differences in the occurrence of coffins among children and adults, and between adults of the two sexes. Children were provided with coffins 2—3 times less frequently than adults. Females were placed in coffins more often than males. Two cases have to be added to the burial of males in coffins where the dead male was placed on a plant stalk and placed with it into a coffin.

Less frequent were burials on a plank and burials placed in a pit in the mudbrick wall or its destruction. Burials on a plank were twice as frequent for children and females compared with males. Burials in a pit were 3—4 times more frequent for children than adults, being, at the same time, a bit more frequent for males than females. In one case the child was placed on a plant stalk and with this into a pit.

On rare occasions (one male and one child) the body was protected with one or more stone blocks and two burials of children of young age (I 374/1, 1/2—3/4 year; J 394, 1/4—1/2 year) were placed in clay storage jars. In the first of these cases the child was placed with the head towards the mouth of the jar, in the second case, the skeleton was jumbled together in the storage jar.

In less than one quarter of the cases the deceased were placed loosely in a layer of sand with small limestone chips (sometimes with an admixture of clay or sherds), and often without traces of original protection. Only in one case did the dead lie on plant stalks (I 413, 11—12 year old child), in another wrapped in a mat (J 1553, 7 year old child) and in a further, it was wrapped in linen (J 1744, adult female). Remains of textile fabrics (probably linen) survived, however, in another 18 burials of seven males, six children and five females. It, therefore, seems likely that the protection of the dead body by wrapping it in linen was more frequent.

Traces of manipulation of the dead body before burial were observed in 5 cases. This includes three cases when the body was forcefully pushed into a coffin that was too short or tight in relation to the dimensions of the body of the deceased. This was the case of burial I 462, a 6 year old child, stature 123 cm, with a coffin 90 cm long. The skull and legs of the skeleton were absent, the left arm rested below and the right above the thorax. In the case of burial J 1761, an adult male with a stature of 172 cm, the lower extremities did not articulate in the hip joint, and it seems that the body was pushed with force into a 180 cm long coffin. Further, in the case of burial J 1950, a 18—19 year old female with stature of 163.2 cm, a disturbed skeleton was found in a smaller coffin without lid, secondarily disturbed and surviving only to the length of 90 cm.

In the case of burial J 1894, a 2 year old child lying on its back in a layer of sand with limestone chips, the left arm was torn out of the shoulder joint and placed lengthwise on the left half of the trunk; the right arm lay in ritual position alongside the body. Finally, in the case of burial J 1973, an adult male in stretched position on the back, the shoulders and the thorax were observed to have been pressed together and towards the spine, the left forearm was pushed below the pelvis, while the right arm lay in ritual position with the forearm on the pelvis and the hand in the lap.

Several burials were secondarily disturbed by robbers or by other interferences into the terrain. Only isolated parts of the skeleton survived of some of these burials.

B) THE RITUAL POSITION OF THE BURIALS

In the overwhelming majority of cases the dead body rested in a stretched position on the back (tab. 8:2). Two males (J 1606, J 1761) lay stretched on the left side, two infants (I 316, 1 year; I 326, 1/2—3/4 year) were found in a flexed position, the first on the right side, the second on the left side. Both simultaneously showed unusual orientation S—N, so that the first lay with the face to the E, the second with the face to the W (see sub C below).

The position of the arms was most frequently with the forearms over the pelvis and the hands in the lap (in 3/5 of

all cases). In the case of males this position was a bit more frequent than in females. In not quite one third of all cases the arms lay loosely alongside the body with the hands on the lateral aspects of the thighs. This position was, on the contrary, more frequent with females than males.

In the remaining cases there was a combination of these two basic positions. In the case of two males and two females the left arm lay with the forearm on the pelvis and the hand in the lap; the right arm loosely alongside the body; in the case of one child, on the contrary, the left arm lay alongside the body, the right on the pelvis, with the hand in the lap.

Occasionally there were anomalous positions: in the case of one child the left arm was flexed at the elbow, the forearm and hand lay on the chest. In the case of one female the left hand lay loosely alongside the body, the right was flexed at the elbow and the forearm lay diagonally across the pelvis with the hand on the left side of the pelvis. Two further anomalous positions of the arms probably are related to forceful manipulation with the body; they were described at the end of part A of this chapter (burials J 1894 and J 1973).

It is interesting to note that the position with both arms crossed on the chest did not occur at the Abusir cemetery.

C) ORIENTATION OF THE BURIALS

The basic orientation of the burials around the Mastaba was the direction with the head to the W and the feet to the E. If we add to this the comparatively frequent deviations with the head to the SWW and SW or to the NWW and NW, we get 97 cases out of 112 evalued, i.e. 86.6 %. The remaining 15 cases, i.e. 13.4 %, have a different orientation. The occurrence of individual categories show certain differences in relation to demographic data (tab. 8:3).

The basic orientation with the head to the W was ascertained for children in less than one half of cases, less often than for adults, among whom a comparatively small difference can be observed with larger representation of females compared with males. Deviations from this basic orientation to the NWW are generally almost twice as frequent as deviations to the SWW. This ratio of the two deviations is adhered to in all categories, but among children both deviating positions are more frequent than among adults, where it occurs more often among females than males.

The directions to the NW and SW can be regarded as marginal deviations from the basic orientation, and, on the whole, they occurred in the same ratio and only a small number of cases. They were more frequent among children than adults.

The remaining directions of orientation can be considered as non-typical for the cemetery. Among these most often the position with the head to the S was found, less so to the E and least to the N. In the case of males, these orientations appeared in a balanced ratio and in a total of six cases. In the four case of females the direction to the S prevails over that to the N (orientation to the E does not occur). In five cases of children the orientation to the S prevails over that to the E (orientation to the N does not occur). The differences are not significant in view of the small number of cases.

In 5 of the mentioned 15 cases of different orientation it is clear that they were conditioned by the placing of the burials into an older structure showing an orientation different from the W—E direction. These were burials I 304 and I 316 deposited in pits in the mudbrick enclosure wall, running in a direction S—N (burial I 316, furthermore, in an anomalous flexed position). Burial I 400 lay in the fillings of the brick double tomb to the north of the Mastaba of Tepemanch (oriented with its longitudinal axis S—N); burial I 445 used a similarly oriented annex of mudbricks, east of the NE corner of the Mastaba of Tepemanch, and burial J 1606 lay parallel and with its back supported against the W wall of a right rectangular structure of irregular blocks of local limestone, the shaft of the Mastaba perhaps of the younger Ptahshepses (?).

In the other 10 cases it was not possible to show any influence on orientation by other structures. It cannot be excluded, therefore, that the orientation with the head to the E might have been connected with the dating of the relevant burials to the Greek period and the orientation to the S or N to the Roman period (see Chapter 3, part F).

A general survey of the orientation of the burials at the described cemetery is given on fig. 8:1.

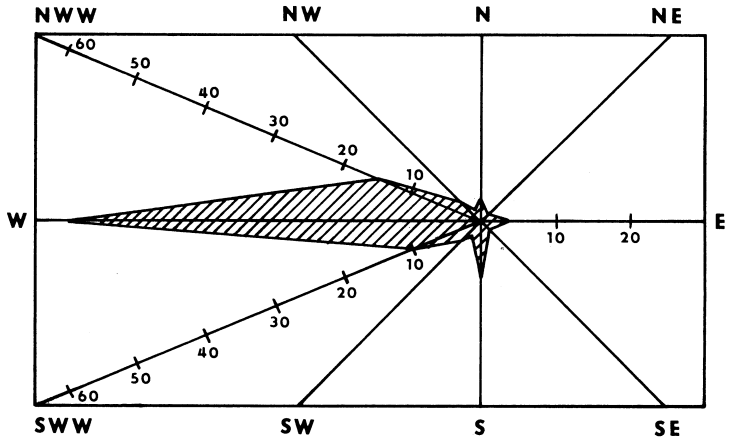


Fig. 8:1 Orientation of the Burials around the Mastaba expressed in Percentage

D) THE QUESTION OF SEASONALLY DETERMINED ORIENTATION

Deviations from the basic orientation with the head to the W were not evenly distributed (tab. 8:4), but the direction of the head to the NWW prevailed over that to the SWW. To assess in more detail possible influences of seasonally determined orientation, the orientation of skeletons were measured in the 1974 season with a precision to angles. The results of this observation are summed up on tab. 8:4.[43]

43 The numerical data in the preliminary report (STROUHAL 1976) are a little higher as they contained a few problematic data which were omitted in the final report.

If we assume the hypothesis that the deceased placed with the head to the W were to have a view oriented to the place where the sun rises on the day of burial, it is possible to divide the burials with typical orientation, including deviations, into three categories. They are burials orientated the head to the W at a range of deviation of 11° to the N and 11° to the S (which would include all burials deposited during spring and autumn), further burials with a deviation of the head to the S at a range of 12° —40° (summer burials) and finally burials with a deviation of the head to the N at a similar range (winter burials).

From tables 8:4 and figure 8:2 one can deduce that in the whole material the majority of burials falls into the first category, which, after division by two, gives a share of 28.8 % for the spring and autumn periods. A surprisingly small percentage, only 12.1 % of burials, occurred in the summer period, compared with two and a half times more — 30.3 % — in the winter period.

If we take into acount age and sex, we see that this differs greatly for adults and children, slightly less for males and females. While characteristic for adults is the greatest number of deaths in the spring or autumn (30.8 %) followed by winter (28.2 %) and, by contrast, a minimum share in summer (10.3 %), in the case of children we can observe greater mortality in winter (33.3 %), less in spring and autumn (26 %), and least in the summer (14.8 %). As to differences between the sexes, in the case of females, stress is on spring and autumn deaths as against winter and particularly summer mortality.

This picture might well be connected with the seasonal fluctuation of the frequence of certain endemic and respiratory diseases that caused the strikingly large and premature mortality of the Abusir population (cf. Chapt. 7). Accordingly, the summer period with lowest mortality shows itself as most advantageous from the point of view of health.

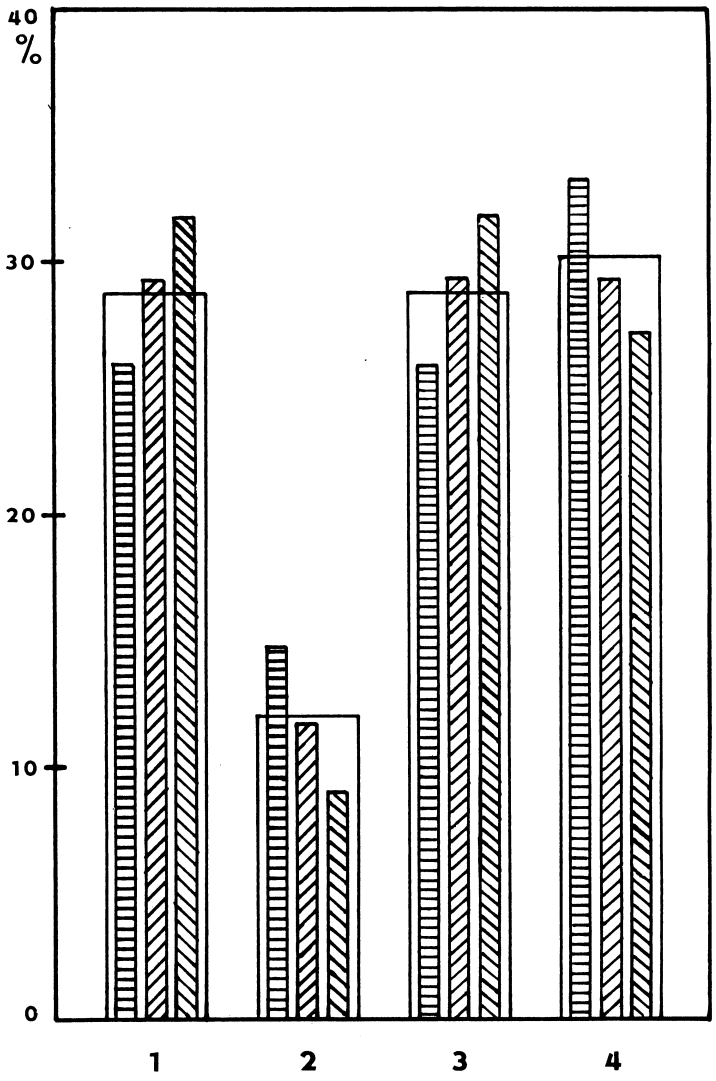


Fig. 8:2 Probably Seasonally Determined Orientation of the Burials

CHAPTER 9

CRANIOMETRY

(With the statistical collaboration of O. SOUDSKÝ)

A) COMPARISON OF THE FIRST AND THE SECOND SERIES

For methodological reasons craniometric dimensions (n=69) and indices (n=61) were worked out separately for the first series (from inside the Mastaba) and for the second series (from around the Mastaba), and their means and variances were compared with the aid of t- and F-tests (tab. 9:1). On the one hand, striking sexual differentiation inside each series can be seen, on the other hand, on comparing the male and female elements, there is a clear identity between the two series.[44]

Sexual differentiation refers more to dimensions than indices, and it is more striking in the second series than the first. It appears in statistically significant results of pair t-tests for one sixth of features in the first series and almost one quarter of features in the second series. On the other hand, only a few significant differences were discovered in the F-tests, in the first series only in dimensions, in the second only in indices, so that they can be regarded as random.

The striking identity of the two series is proved by the low total of statistically significant differences in the two tests mentioned (2.3—3.1 %). Significant differences in measurements and indices (tab. 9:2) differ for each sex. At the same time, within the framework of each sex, these are scattered features that do not form logical complexes. In the significant differences of variance (F-tests) we can observe a generally smaller range in the first series with the exception of the vertical craniofacial index of females, where the range is smaller in the second series. Of the significant differences in mean (t-tests) five are on the level p=0.05, only one on the level p=0.01. These are generally features with a small number of cases in one or both series compared where one aberrant value might influence the mean. The results of comparison show, in our view, convincingly that both series represent a selection of the same basic population. For that reason we have joined them into one set (with a male and a female section) for further analysis.

44 For lack of space this monograph could not include detailed tables of craniometric values of both series.

B) MEASUREMENTS AND INDICES OF THE CEREBRAL SKULL

The results of elaboration of 24 measurements and 29 indices of the cerebral skull of the male and female series of the joined material from the secondary cemetery in the Mastaba of Ptahshepses at Abusir are given in table 9:3. Apart from the usual measurements according to MARTIN and SALLER (1957), the bicristal breadth of the skull (the greatest distance between the lateral prominences of the two cristae supramastoideae) were measured, and three measurements were taken on the processus mastoideus. The length was based on GILES and ELLIOT (1963) as the projective distance from the plane through porion (parallel with the Frankfurt horizontal plane) to the tip of the processus mastoideus. The thickness is the maximum distance from the bottom of the incisura mastoidea to the lateral prominence of the processus mastoideus at the level of the bottom of the incisura. The breadth is understood to be the maximum antero-posterior dimension measured somewhat obliquely on the longer axis of the processus mastoideus.

Apart from the usual indices according to the technique used by MARTIN and SALLER (1957), the mean height index was calculated according to HRDLIČKA (1920), the acroplatic index according to BENINGTON (1911-12) and the height index of neurocranium as porion-bregma height in percentage of basion-bregma height. Furthermore, three additional breadth indices of neurocranium were introduced, expressing (I) the biauricular, (II) the bimastoideal and (III) the bicristal breadth in percentage of the maximum breadth of the skull; further, two breadth indices of the skull base expressing (I) the bimastoideal and (II) the bicristal breadth in percentage of the biauricular breadth, and finally, the modulus of processus mastoideus, which expresses the mean of the three measurements of this prominence given above (the calculation is analogical as for the skull or facial module).

Table 9:3 shows clear sexual differences in the measurements of the cerebral skull, which is greater among males than females. With the aid of pair t-tests high significance (on the level of p=0.01) was shown for 12 measurements (50%), viz. maximum length of the skull, length of the foramen magnum, maximum frontal breadth, biauricular, bimastoideal and bicristal breadths, basion-bregma height,

horizontal circumference, transverse and sagittal curves and length and breadth of the processus mastoideus. Significant difference (on the level of $p = 0.05$) was found for another measurement (4.2%), maximum breadth of the skull. The difference in several other measurements approximated on the threshold of significance.

Among individual measurements the minimum variability expressed by a coefficient of variation, was shown in both sexes by the horizontal circumference, the sagittal curve, and the maximum length of the skull, in the case of females also maximum and biauricular breadths. On the other hand, strikingly great variability appears in both sexes for the measurements of the foramen magnum, the occipital arch and, particularly, the measurements of the processus mastoideus.

In the indices we can most often observe virtual identity between the two sexes (12, i.e. 41.4%); partly they are higher for males (10, i.e. 34.5%), partly, on the contrary, higher for females (7, i.e. 24.1%). With the aid of pair t-tests seven (24.1%) highly significantly different indices and one (3.4%) significantly different index were found (see below). Both sexes did not greatly differ in the variability of indices, with the exception of the sagittal occipital index (3.4%), which differs significantly in the F-test. Of individual indices, the lowest variability, expressed by the coefficient of variation, was shown in both sexes by the sagittal frontal index, the sagittal index of the skull vault, the sagittal parietal and occipital index, the cranial modulus, both breadth indices of the skull base and the height index of the neurocranium. On the contrary, great variability can be observed in both sexes in the sagittal parietooccipital index, in the modulus of processus mastoideus, in the foramen magnum index, and in the sagittal frontooccipital index, for females, further, in the sagittal frontoparietal index. Extreme coefficients of variation of the acroplatic index can be disregarded in view of the current values of standard deviation; they are the result of too low mean values of this index.

The indices simultaneously reveal the shape of the Abusir skulls. With regard to the classical classification according to MARTIN and SALLER (1957) the skull index of males is, on the average, dolichocranic, close to the border of mesocrany, and its range covers dolichocrany and mesocrany. By contrast, in females, it is mesocranic (the difference is highly significant) its range shifting higher towards the brachycrany. The height-length index (from the basion) is, on the average, orthocranic for both sexes, its range in males is chamae- to hypsicranic, in females likewise but clearly narrowed. The height-breadth index (from the basion) lies, in males, on the average, on the border of the metrio- and acrocrany, in females, by contrast, in the middle of the metriocranic category (the difference is highly significant); the range begins at the upper border of tapeinocrany and stretches far into acrocrany, in males further than in females. The mean height index is found for both sexes in the middle categories of classification by STEWART (1965, 1973), being significantly higher for males than females. The majority of cases of its range are in the same category with overlaps into the lower and the higher ones, more in males than females. For both sexes the acroplatic index is positive, significantly higher in females, which, according to BENINGTON'S evaluation (1911—12), fits fully into the range of the Europoid variety. The height-length index (from the porion) is equally orthocranic for both sexes, on the average, the range tending slightly more to the tapeinocrany and covering the ortho- and hypsicranic categories. The height-breadth index (from the porion) lies in males, on the average, in the metriocranic category, in females, at the border of the tapeino- and metriocranic categories; the range covers all categories, shifting lower for females compared with males. The height index of the neurocranium shows values that express good vaulting of the skull base without flattening.

Sexual dimorphism is clearly expressed in all breadth indices of the neurocranium. The breadth measurements of the lower part of the cerebral skull in relation to the maximum breadth of the skull, expressed in breadth indices of the neurocranium I—III, are highly significantly greater in males than in females (the significance could not be proved only in the IInd index). On the contrary, the ratios of the bimastoideal and bicristal breadths to the biauricular breadth, expressed in breadth indices of the skull base, are practically identical for both sexes.

Both indices of the skull vault (sagittal and transversal) are similar for both sexes and express well arched vaults.

The transversal frontal index lies in the category of the medium forehead, close to the border of the category of the rounded forehead; its range covers parts of both categories. The transversal frontoparietal index is close to the border of metrio- and eurymetopy, the range stretching from steno- to eurymetopy, in females being slightly shifted higher than in males.

The sagittal indices express the ratio between individual sections of the skull vault and show, on the average, in males a balanced ratio between the frontal and the parietal section, in females, a predominance of the parietal section, and, in both sexes, a slightly lower but relatively quite important contribution of the occipital section. The same is expressed by the indices of individual section of the sagittal curve. As to the degree of curving of individual sections, expressed in the sagittal indices, the usual order was found from a maximum at the occipital to medium at the frontal and minimum in the parietal section.

The index of the foramen magnum reveals a relatively broad shape, particularly in females. The cranial modulus corresponds to the greater measurements of the cerebral skull of males compared with females, the modulus of the processus mastoideus expresses the same; both differences are statistically highly significant.

C) MEASUREMENTS AND INDICES OF THE FACIAL SKULL

The results of elaborating 17 measurements and 18 indices for both sexes are given in table 9:4. The technique of measuring corresponds to the method of MARTIN and SALLER (1957), with the exception of mid-facial breadth, which was not measured on the lower edge of the sutura zygomaxillaris, but on its point of intersection with the

lower anterior edge of the two adjacent bones (our results, compared with the classical method, are cca 1 mm smaller). Apart from dental length (P_1 — M_3) the mesiodistal length of the molars (M_1 — M_3) was also measured. The upper molar index was added to the current indices as the ratio of the molars to the length of the skull base and the Martin-Saller vertical nasofacial index was modified since the more usual height of the nose (ns-n) was used instead of the prescribed height of the apertura piriformis (ns-rhi). The point rhinion had not survived in a considerable number of cases.

All measurements of the facial parts of the skull show greater values for males compared with females, with the exception of an almost identical orbital height. The differences of three measurements (17.6%) i.e. the upper facial breadth, the maxilloalveolar length and the upper dental length are highly significantly distinct, two others (11.8%), i.e. the biorbital and the bizygomatic breadths, are significantly different. By contrast, the two sexes do not differ greatly in variability, with the exception of the significantly greater variability in the length of the molars in males and the insignificantly greater variability in the facial height of males. In females, the smallest value of the coefficient of variation was found for the bizygomatic breadth, in males for the maxilloalveolar length. On the contrary, strikingly great variability was shown for both sexes in maxilloalveolar height.

The majority of the indices were found to be, on the average, a little greater in females (10, i.e. 55.6%) fewer were slightly smaller (5, i.e. 27.8%) and the smallest number were identical for both sexes, (3, i.e. 16.7%). The differences are mostly statistically insignificant, with the exception of the significantly larger upper facial indices (according to Kollmann) and the significantly lower facial modulus (2, i.e. 11.1%). In variability the two sexes do not differ significantly in the F-tests, even if the variability of the upper molar index appears much larger in males than females. The lowest variability was shown among females by the vertical nasofacial index, in both sexes by the facial modulus and in males further by the gnathic index, the highest variability was found in the upper molar index of males, mentioned above, and the maxilloalveolar index of females.

The facial index according to Kollmann is, on the average, mesoprosopic in males and on the border of meso- and leptoprosopy in females. Its range begins in males at the upper part of the hypereuryprosopy and in females only in the upper part of the euryprosopy and stretched in both sexes as far as the lower part of the hyperleptoprosopy. The facial index according to Virchow is, according to Holl's classification (in MARTIN and SALLER 1957), on the average, chamaeprosopic in both sexes, the range covering the upper part of the hyperchamaeprosopy to the lower part of the orthoprosopy (slightly higher in females). The index of the upper face, according to Kollmann, is mesene in males, and in the lower part of the lepteny in females (the difference is statistically significant), the range stretching in males from the upper part of the euryeny to the lepteny, in females from the meseny on the border of the lepteny and the hyperlepteny. The index of the upper face according to Virchow is, according to Holl's classification, on the average chamaeprosopic in both sexes, the range begins in males at the border of the hyper- and chamaeprosopy and, in females, in the chamaeprosopic category and continues for both sexes throughout the lower half of the leptoprosopy.

The jugomalar index is insignificantly higher in females than males. The orbital index in both sexes is, on the average, mesoconchic (in females insignificantly higher than in males), the range starting, in males, from the chamaeconchy and, in females, from the mesoconchy and ends for both sexes in the lower part of the hypsiconchy. The interorbital index shows insignificantly greater relative inter-eye distance for males compared with females.

The nasal index of both sexes is, on the average, mesorrhin, and its range covers the lepto- to chamaerrhin categories (in females shifted slightly lower). Hyperchamaerrhiny, which might reveal an admixture of the Negroid variety, is not present. The transversal nasofacial index shows relatively narrow noses, while the vertical nasofacial index expresses their relatively great height.

The maxilloalveolar index of both sexes, is, on the average, mesuran with a rather large range (wider for females than males) from the dolichouran to the brachyuran categories. The gnathic index lies, on the average, in the orthognathous category in males, and on the border of the ortho- and mesognathous categories in females, its range covering, for both sexes, the orthognathy and in males the lower edge, in females the entire range of the mesognathy. Significant again is the absence of prognathy, which is typical of the Negroid variety.

The facial modulus, statistically significantly higher in males than females, again expresses the strikingly large difference in size between the two sexes.

The upper dental index for both sexes lies, on the average, in the upper part of microdoncy. It is interesting that its range among males is almost exclusively in the microdontic category with a small overlap to the mesodontic, and among females it runs from the upper part of the microdontic to the lower part of the megadontic category; but the differences are not significant. Likewise the upper molar index shows an insignificantly greater relative length of the molars in females than males.

The longitudinal craniofacial index expresses identically for both sexes a relatively small length of the face, on the average and in range, which again indicates the absence of the Negroid admixture. The vertical craniofacial index confirms the trend of females to a relatively higher structure of the face, observed already in the facial indices. The transversal craniofacial index shows, on the average and in range, a higher value for males than females (near to the threshold of statistical significance). The average of males is noticeably higher than the mean values given for European series (87 — 91.5 according to Martin and Saller 1959: 1375), the mean of females is less strikingly higher (87.2 — 88.0, ibid). Both means of the series from Abusir, however, do not reach the mean values of Negroid series. Of individual values the indices were higher than 100 only in the case of two males (A 29e: 101.5, A 43/3A: 102.1), devoid of Negroid features.

D) MEASUREMENTS AND INDICES OF FACIAL PROFILATION

To express the three-dimensional (relief) characteristics of the facial skeleton current angles of vertical profilation, measured according to the MARTIN and SALLER (1957) technique on the skull fixed in a Frankfurt horizontal, were used, supplemented by a set of measurements and indices of horizontal profilation according to Woo and MORANT (1934) and LEVIN (1960), whose techniques we described elsewhere (STROUHAL and JUNGWIRTH 1984). The results of measuring 7 angles, 9 measurements and 5 indices are given in table 9:5.

Even if no statistically significant differences between the two sexes were found in the angles, a comparison of females with males shows a tendency towards a more vertical angle of the forehead, a greater prominence of the nasal roof and cheek-bone and a greater prominence of the facial profile in the mid-line. The total profile angle in males lies, on the average, on the border of the meso- and orthognathy, in females it is mesognathic; the range in males covers the meso- and orthognathy, in females it is enlarged from the prognacy to the orthognathy. The nasal profile angle is, on the average, orthognathous in males, and a little closer to the border between the ortho- and the mesognathy in females; its range is meso- to orthognathous in both sexes. The mean alveolar profile angle lies in males in the upper part, in females in the middle of the prognathous category; its range in males begins in the upper part, in females in roughly the middle of the hyperprognathous category and ends in males in the middle of the orthognathous and in females at the border of the meso- and orthognathous categories. The three profile angles fall with their means in the range between the values of African and European sets, close to the values of "Egyptians" in the table by MARTIN and SALLER (1959: 1378). Among the angles, the lowest variability was shown by the nasal profile angle, the highest by the profile angle of the nasal roof.

The dimensions of horizontal profilation in females being generally a little lower than in males (the difference was statistically significant only for the nasal prominence above the anterior interorbital breadth). The variability of these measurements expressed by coefficient of variation, is considerably raised in both sexes in view of the mostly low mean values, mostly so in the simotic subtense.

The indices of horizontal profilation are insignificantly lower in females than in males (with the exception of the zygomaxillar index). Their variability is similar in both sexes with the exception of an insignificantly greater variability of the simotic index and highly significantly greater variability of the zygomaxillar index in males. The index of facial flatness shows relatively little profilation, particularly in the case of females. The simotic index and the index of nasal prominence reveal identically striking projection of the nasal bone in both sexes and of the whole nasal area, both in averages and in range (with the exception of an extraordinary low value 20.0 for male A 23a, who does not have Negroid features), which places the whole set into the Europoid range. The zygomaxillar index expresses the medium large prominence of the nasospinal area of the face and the index of the incisura maxillaris its quite striking profilation.

E) MEASUREMENTS AND INDICES OF THE MANDIBLE

The lower molar length measured in analogical manner as the upper molar length was added to the usual set of measurements and indices of the mandible, which is presented in table 9:6. Sexual dimorphism appears in the measurements of the mandibles even more clearly than in other parts of the skull. All measurements for males are strikingly larger than for females, with the exception of the mandibular angle, which, on the contrary, is greater in females. 6 of the 12 measurements (50.0%) are statistically highly significantly different (mandibular length, height and thickness of the body, both heights of the ascending ramus and the lower molar length), other are close to the threshold of significance. The variability of measurements is similar for both sexes and is greatest in thickness of the body and the second height of the ascending ramus (while the first height of the ascending ramus is less variable.

In the indices females differ from males by an insignificantly higher mean of the mandibular index and a highly significantly higher mean of both indices of the ascending ramus and, on the contrary, an insignificantly lower mean of the breadth index of the mandible and a highly significantly lower mean of the frontomandibular index. The other indices are similar for both sexes. On the whole, 3 of the 9 indices (33.3%) differ highly significantly. The variability of indices for both sexes is similar (with the exception of the slightly higher variability of the first index of the ascending ramus in females and the index of thickness of body in males). It is generally conspicuous, greatest for both indices of the ascending ramus and the index of thickness of body.

Of the individual indices the mandibular index expresses a medium ratio of the length and breadth of the mandible, the indices of the ascending ramus a trend towards a higher and narrower ramus, the breadth index a tendency to a more oblique position of the rami (with a larger difference between the bigonial and the bicondylar breadth) and the index of thickness of body its relative robusticity.

The lower dental index of both sexes lies, on the average, on the lower edge of the megadontic category according to Flower's classification, and its range in males begins at the upper part of microdoncy, in females it covers the whole range of microdoncy and ends for both sexes in the megadontic category. The lower molar index, likewise, shows clearly higher values than the upper molar index.

The jugomandibular index is identically high for both sexes and has a relatively little variability. This points to the great correlation between the bigonial and the bizygomatic breadth of the face. On the contrary, the frontomandibular index in males shows a higher mean value lying on the upper edge of the mesomandibular category according to the evaluation of ŠKERLJ and DOLINAR (1950), in females the value is lower, somewhere below the middle of

the same category. The range in males covers the meso- to eurymandibular categories, in females it begins already at the lepto- and goes to the eurymandibular category.

F) COMPARISON OF THE SERIES FROM ABUSIR AND GIZA

To judge the craniometric results of the series from Abusir we have selected from the rich craniometric literature on ancient Egypt (STROUHAL 1975) an extensive, in time roughly contemporaneous, series from excavations of the cemetery south of the pyramids at Giza, which was carried out by M. Flinders Petrie in 1910. It was dated into the 26th to 30th dynasties (664 — 341 B.C.; the original range was given 600 — 200 B. C.), which corresponds, in its major part, to the chronological span of our series.

The skulls from Giza were handed to the London Biometric Laboratory, where they were first used for a few special publications and then metrically elaborated and published by K. PEARSON and A. G. DAVIN (1924). Of the total number of 1 800 skulls unearthed during the excavations they used over 900 skulls for the male and some 600 skulls for the female subseries after deducting the immature, anomalous and fragmentary ones. The series is one of the largest in world craniological literature so that it provided the authors with a suitable base for basic studies on the variations and correlations of individual measurements of the human skull. Marked "Series E" it became the representative set of ancient Egyptians. Its strikingly small variability is often emphasized, which, in the view of the authors, proof of the homogeneity of the initial population.

For a comparison with the values of the series from Abusir it was possible to use of the whole set of measurements and indices by PEARSON and DAVIN (1924) only those where the definitions of the Martin and Saller system and that of the London Biometric Laboratory were identical. On the whole, 22 measurements and 5 indices were used, which can be considered sufficient to ascertain the mutual relationship of the two sets.

The results are summarized in table 9:7 and show that some measurements are a little higher at Giza (9 in males and females), others at Abusir (8 in males and females), and the remaining are practically identical (5 in males and females). Similarly the comparison of indices shows a predominance of Giza (one in a male and a female) or Abusir (2 in males and 3 in females), or a balance (2 in males and one in a female).

With the aid of pair t-test it was ascertained that 5 measurements (22.7%) for males and 9 measurements (40.9%) for females were significantly or highly significantly different. For males this concerned the maximum breadth of the cerebral skull and the transverse curve, significantly greater at Giza, the occipital arch and chord, significantly larger at Abusir, and the length of the face, highly significantly greater at Abusir. In females it was the length of the skull base, the length of the foramen magnum and the porion-bregma height, all significantly greater at Giza, the horizontal circumference, highly significantly larger at Abusir, the transverse curve, highly significantly larger at Giza, the occipital arch and chord, highly significantly larger at Abusir, the length of the face, significantly larger at Abusir, and the total profile angle of the face, significantly larger at Giza.

Among indices only the nasal index of males and the foramen magnum index of females were different, both significantly greater at Abusir.

The variability of the two sets is very similar, for males it is slightly larger in 13 measures at Giza, in 9 measurements at Abusir, for females 10 measurements at Giza and 11 at Abusir (in one case it is identical). The indices had a slightly larger variability for males in three cases at Giza and in two at Abusir, for females in one case at Giza and in four at Abusir. With the aid of F-tests only the variability of the facial length of males at Giza was shown as significantly larger, and likewise as significantly larger in both sexes was the variability of the foramen magnum index at Abusir. The results show that the Abusir set has practically the same low variability as the set from Giza, so that it represents an equally homogeneous population.

One fifth of significantly diverging features in males and two fifth in females convincingly show that the people buried at Abusir and Giza belonged to independent population communities, among whom there existed a relatively small gene flow. This conclusion corresponds also to the geographical distance between the cemeteries, which is about 15 km.

In the near future we intend to compare the craniometric and osteometric values of the series from the secondary cemetery at the Mastaba of Ptahshepses at Abusir with the results of three chronologically contemporaneous series. These are the series from the recently completed Czechoslovak excavations in the area of the Mortuary Temple of Queen Chentkaus in the Southern Field at Abusir, further from the area of the chapels and shafts of the Horemheb tomb at Saqqara and finally that of the cemetery in the stratum under the temple-town of Anubieion at Saqqara. This will complete the picture of the population buried from the Late to the Greek Periods in the ruins of buildings of the former royal cemeteries from Giza to Saqqara.

G) COMPARISON OF HISTORICAL AND RECENT MALES FROM ABUSIR

Some craniometric features in the series of males from the secondary cemetery in the Mastaba of Ptahshepses at Abusir can be compared with analogical dimensions of the head taken during anthropological research of a group of males of the recent population of Middle and Upper Egypt in 1961 (STROUHAL and REISENAUER 1963). A comparison of this type, unusual in literature, meets with a number of methodological difficulties. First of all, the set of comparative measurements is restricted to those that can be carried out from the same points on the head as on the skull. Among these a number of important measurements are not to be found, e.g. the breadth of the nose, measurements of the eye-sockets and the like. Further there arises the question whether the correction used for deducting the

thickness of the soft tissue[45] are suitable in the given series of recent males from Abusir with their slim body structure and minimal layer of subcutaneous fatty tissues. For these reasons our comparison should be regarded as experimental.

The comparison of seven measurements of historical and recent males from Abusir are given on table 9:8. It shows that in both series the structure of the cerebral skull differs in all three compared measurements. The recent Abusir males have statistically significantly shorter and narrower cerebral skulls (i.e. smaller as such), by contrast, however, a highly significantly broader forehead. In the facial dimensions they differ only by the significantly narrower bizygomatic breadth, while the bigonial breadth and the height of the face and nose are practically identical with the mean values of the historical males from the same locality.

The results given cannot unequivocally prove nor reject the genetic continuity of the population in the Abusir area during the last two thousand years. If we accept this as a working hypothesis, the relatively large difference between the two series (57.1% of significantly or highly significantly different measures) shows that during this time there occurred morphological changes among the population of the Abusir area, either as a result of developmental processes or under the influence of hybridization. On the other hand, we cannot exclude the possibility that the historical and recent Abusir males belonged to two separate communities of population linked by a relatively small gene flow.

45 9 mm were subtracted from the maximum length of skull and the minimum breadth of forehead (according to Kollmann and Büchly 1898, tab. 4), 8 mm from the maximum breadth of skull, 8 mm from the bizygomatic breadth (correction for "slimly built individuals" according to Sutton 1969), 6 mm from facial height (according to Kollmann and Büchly 1898, Tab. 4) and 12 mm from the bigonial breadth (according to Gerasimov 1955: 106).

CHAPTER 10

OSTEOMETRY

(With the statistical collaboration of O. SOUDSKÝ)

A) COMPARISON OF THE FIRST AND THE SECOND SERIES

As in the case of craniometric data osteometric measurements and indices of individual bones in both series (tab. 10:1) were compared and evaluated with the aid of F- and t-tests.[46]

The sexual differences in osteometric features proved to be in both series even more profound than the craniometric ones. Generally there is to be seen in both series an almost identical percentage of statistically significant results of F-tests, concentrating chiefly on femora and vertebrae. Similarly, the four times higher percentage of statistically significant results of t-tests is practicaly identical for both series. In the first series they are most frequent at the radius and femur, in the second at the long bones of the upper extremities and at the small bones of the lower extremities.

In comparison with this, within the framework of the same sex, statistically significant differences between the first and the second series in both tests are less frequent. Exceptionally there are significant differences of F-tests, particularly in males. The differences in t-tests are a little more frequent, admittedly, in males at the clavicle, tibia and radius, in females at the tibia and femur, but (as table 10:2 shows in detail) they apply, to a large extent, to differences in weight of the bones and the weight-length indices. If we do not take into account the weight and the weight-length indices, there remains a mere 4.8—5.3 % of significantly different osteometric measurements and indices between both series.

The statistically significantly different results of F-tests and t-tests are given in table 10:2. Systematic difference is to be found in both sexes in the weight and weight-length indices, which are permanently higher in the first than in the second series. This difference can be found likewise in weight and weight-length indices of other bones, where significance was not shown (see further sub B and table 10:3).

Among other significantly differing results there is, identically in both sexes, a striking occurrence of the measurements of certain vertebrae. As to differences in F-tests, (2 for males, 2 for females) in all cases it can be seen that variability in the first series is by more than one half less than in the second series. As to differences in t-tests (2 for males, 3 for females) mostly among males the mean values of the first series are higher than those of the second series, on the contrary, among females the averages of the first series are lower than those of the second series (with the exception of Th_5). The results in the first series can be artefacts resulting from sexing isolated vertebrae on the basis of their size and robusticity.

Among other differences for males F-tests showed a statistically significantly higher variability of depth of concavity of the sacrum in the first series as a result of the existence of either extremely flat or extremely deep sacra, while in the second series only "normally" vaulted sacra were present. In t-tests there is a highly significant difference in the length of the right clavicle, larger in the first series than in the second, conditioning also the highly significant difference in the derived index of robusticity, which is smaller in the first as against the second series. Further, among males of the second series in comparison with the first there is a larger index cnemicus, highly significantly on the left, significantly on the right.

Of other differences in females in F-tests there is a statistically significant greater variability of the length of the right clavicle in the second series, of the minimum circumference of the right ulna and the index of robusticity of the right ulna in the first series, and of the right subtrochanteric antero-posterior diameter in the second series. In t-tests only the antero-posterior diameter of the right midshaft and the index pilastricus of the right femur of the second series are significantly greater.

These results indicate that very few real differences were found, that they are scattered unsystematically and are, in all likelihood, of a random nature. From an osteometric point of view also we can, therefore, regard both series as belonging to the same basic population and treat them as a whole.

B) DIFFERENCES IN THE WEIGHT OF BONES OF THE FIRST AND THE SECOND SERIES

The large number of differences in weight-length indices statistically significantly higher in the first as compared with the second series reveal a systematic difference. To

46 For lack of space this monograph could not include detailed tables of osteometric values of both series.

clarify it we confronted all values of weight and weight-length indices of males and females separately on both sides. As table 10:3 shows, all values without exception are higher in the first series than in the second. The relation of differences of individual features is expressed by the ratio (r), which equals the value of the feature of the first series divided by the value of the same feature of the second series. The mean ratios are slightly lower for males (1.1761 on the right, 1.1628 on the left) than females (1.2679 on the right, 1.2068 on the left). For males they have a smaller variability (s_r = 0.0358 on the right, 0.0243 on the left), corresponding to the narrower range (1.1013 — 1.2402 on the right, 1.1299 — 1.2043 on the left), for females the variability is greater (s_r = 0.1153 on the right, 0.0952 on the left), which is in conformity with the wider range (1.0680 — 1.4693 on the right, 1.0134 — 1.3155 on the left). Of the data on weight the lowest ratio is the weight of the fibula, on both sides for males and on the left for females, for females the weight of the radius on the right. Among males we can find the highest ratio in the weight of the ulna and among females that of the tibia.

In a comparison with the values of weight and weight-length indices of other series from the same area, so far under elaboration, the values of the first series appear "normal" while the values of the second series are anomalously low. This is the case even though the first series was scattered material, even possibly transported from elsewhere, while the burials of the second series lay in situ. The cause of this difference does not rest in the method since the scales used were daily calibrated before the beginning of work. As the results of chemical analysis have shown (chapter 6, sub B), the differences in weight are not the result of different dating of the two series. They were caused by the differing content of organic matter, strikingly larger in the first series. We are of the opinion that the greater loss of the organic element in the second series was caused by sudden changes in humidity and extreme drought in layers of desert sand not protected by structures.

C) MEASUREMENTS AND INDICES OF THE TRUNK

This heading covers the sternum, vertebrae, sacrum and likewise the pelvis, which is an anatomical part of the girdle of the lower extremity, but in function has a close relation to the sacrum. The parameters of measurements and indices of the trunk ascertained are given in table 10:4. The method of treatment is based on MARTIN and SALLER (1957). In the addition, an index giving the length of the manubrium in percentages of the length of the corpus was calculated for the sternum. On the sacrum several measurements were worked out separately for the sacrum with five and for the sacrum with six elements. In addition the cranial transversal diameter of the body S_1 was measured, which, in percentages of the frontal upper breadth of the sacrum, forms an index with a striking sexual discriminatory ability (according to STROUHAL and JUNGWIRTH, 1984). On the pelvis we measured the length of the ischium including the acetabulum diameter and, on the contrary, the length of the pubis without the acetabulum; from these values the modified ischiopubic index was calculated (according to THIEME and SHULL, 1957). The height of symphysis in percentage of pubic length gave a further index with striking discrimination between the two sexes (STROUHAL and JUNGWIRTH, 1984).

Table 10:4 shows, first of all, that the variability is similar for both sexes with the exception of 6 measurements (11.3 % out of the number of 53 evaluated pairs), which in F-tests differed statistically significantly or highly significantly. A highly significantly greater variability is shown in the anterior vertical diameter of vertebrae Th_8, Th_9 and L_1 in males, significantly greater variability of the same measurement in vertebrae C_4 and L_2, likewise in males, and the breadth of the right ilium in females. For their small number and scattered appearance we consider these differences random.

Generally varibility is greater in males (54.7 %), less frequently in females (37.7 %) and in the remaining cases (7.5 %) almost identical. The least variability is shown by the variation coefficient in females in the breadth-length index of the right ilium, in males in the breadth of both ilia and in the same index as in females. Strikingly high variation coefficients are to be found in both sexes in the dimensions of vertebrae C_3—C_6 and the height of the right symphysis, in males also in the subpubic index and the length of the left pubis.

If we compare the mean values of measurements in both sexes, they are, in the great majority of cases, higher for males than females (with the exception of the identical anterior upper direct breadth of the sacrum and the greater length of the pubis and subpubic angle in females). By contrast, the majority of indices come out greater for females (with the exception of the index of the diameter of S_1 in relation to the breadth of the sacrum and the indices of symphysis in relation to the length of the pubis). The importance of sexual differences of a large number of mean values are shown by statistically significant or highly significant results of pair t-tests, which were found for 29 measurements and indices (54.7 % of the 53 evalued features); this was most true of the pelvis (12 out of 19, i.e. 63.2 %), further of the vertebrae (14 out of 24, i.e. 58,3 %), less for the sternum (1 of 2, i.e. 50 %), and least for the sacrum (2 out of 8, i.e. 25 %).

If we proceed in the order of individual bones in table 10:4 we find highly significantly greater length of the manubrium of the sternum in males, further, a highly significantly greater transversal diameter C_1 and the anterior vertical diameter of vertebrae C_3, C_5, C_6, Th_1, Th_3, Th_4, Th_7 and Th_{11}, and significantly higher anterior vertical diameter of vertebrae C_4, Th_7, Th_8, L_2 and L_5, all in males. Likewise the cranial transversal diameter S_1 and its index in relation to the breadth of the sacrum are significantly greater for males. On the pelvis the height of the coxae on the right is highly significantly, on the left significantly greater in males, the breadth of the ilium on the right is significantly greater in males, the length of the ischium, the height of the symphysis and the diameter of the acetabulum on both sides are highly significantly greater in males, the subpubic angle, on the contrary, is significantly greater in females

and the ischipubic index on the right is highly significantly, on the left significantly greater likewise in females.

In the case of the sacrum it can be observed that in the six-element type in both sexes there is greater length, while the depth is greater in males, but paradoxically smaller in females (probably as a result of a rather small number of cases). These differences influence the relevant indices (length-breadth and the height of the chord).

On the ilia it is possible to evalue for 9 features measured on both sides, also right-left differences. In males and females higher values either on the right or on the left are in balance (each side 44.4 %), the rest shows an almost identical value (11.1 %), which, in males, is the length of the pubis, and, in females, the breadth of the ilium.

D) MEASUREMENTS AND INDICES OF THE UPPER EXTREMITY

Under this heading table 10:5 includes, apart from the three free long bones, also the clavicle, part of the girdle of the upper extremity[47]. In view of the importance of the weight of the long bones of both extremities for sexing of isolated bones (VALLOIS 1957, FERÁK 1960) weight was determined for all long bones (with the exception of the clavicle). Indices were calcualted expressing weight in decimals of the length of the relevant, i.e. weight in grammes per one cm of bone length. Furthermore, apart from indices given by MARTIN and SALLER (1957) the index of the circumference of the caput humeri was calculated in percentage of its length.

Similar to the preceding one, table 10:5 shows that the variability is similar in both sexes with the exception of 6 features (15 % of 40 features). In F-tests highly significantly greater variability is shown in the weight of the left ulna in males, significantly greater variability is to be found in the circumferences of the right clavicle, the weight of the left and right radius, the minimum circumference of the left ulna and the weight-length index of the left ulna in males. Also in this case do we consider the given differences as random in view of their small number and scattered occurrence.

Generally, variability is often greater in males (60 %), less often in females (35 %), and identical in the remaining cases (5 %). The least variation coefficient is found in females for the length of both ulnae, in males for the circumference of both capita humeri. Consistently there is a strikingly high coefficient for all weight and weight-length indices.

On the bones of the upper extremity the diameter of all measurements and indices are, without exception, greater in males than females. Sexual differentiation reaches a high degree as shown by t-tests of 31 predominantly statistically highly significant and partly significant differences (77.5 %) of the total number of 40 features; most of these are on the ulna (9 out of 10, i.e. 90 %), on the humerus (12 out of 14, i.e. 85.7 %) and on the radius (8 out of 10, i.e. 80 %), fewest on the clavicle (2 out of 6, i.e. 33.3 %).

As table 10:5 shows, significance of differences was not shown only for the length of both clavicles (although the result of the test came close to the border $p = 0.05$) and for the index of robusticity of both clavicles; further, for the index of the caput circumference in percentages of the length of the humerus, for the index of robusticity of both radii and for the index of robusticity of the left ulna. The profound sexual differences in metric features of the bones of the upper extremity are related, in our view, both to the genetic base and to the differing physical activity of the members of each sex.

As to the right-left differences of measurements and indices, which were systematically measured for both sides, table 10:5 shows, for males, a frequent prevalence of the right side (65 %), further concurrence (20 %) and a rare prevalence of the left side (15 %). For females there is likewise a prevalence of the right side (60 %), followed by the prevalence of the left side (35 %) and concurrence (5 %). Even though the differences are small and statistically insignificant, they show the more frequent prevalence of the right side, which corresponds to data from other series and clearly reflects the predominant right-handedness of the members of the Abusir community.

E) MEASUREMENTS AND INDICES OF THE LOWER EXTREMITY

The measurements and indices of the three long bones and three small bones of the lower extremity are summed up in table 10:6. As in the case of the humerus, an index of the caput circumference has been calculated for the femur in percentages of its maximum length. Likewise weight was determined for the long bones of the lower extremity and the weight-length indices were calculated.

If we stated a small number and scattered appearance of sexual differences of variability for the features of the trunk and upper extremity, this is likewise true for the features of the lower extremity with the exception of the femur. Only three statistically significantly or highly significantly differing features were found in F-tests for the tibia, fibula and small bones (9.4 % of 32 features). This is the anterior-posterior diameter of the right tibia, and the length of both calcanei (a highly significant difference on the left), whose variability is always greater in males.

By contrast, on the femur 13 features (50 %) have, in stereotype manner, significantly or highly significantly greater variability in males. This refers to the anterior-posterior and transversal diameters of the midshaft of diaphysis on both sides (all differences highly significant, only the left transversal significant), both subtrochanteric transversal diameters (on the right significant, on the left highly significant), the subtrochanteric anterior-posterior diameter on the right and the caput circumference on the left (both significantly different). Among the indices different variability is to be found in the index of robusticity (on the right highly significant, on the left significant), the pilastric index (on the right significant, on the left, highly significant), and the right platymeric index (significant). The

47 Its further part, the scapula, was not measured in view of the predominantly bad state of preservation.

differences are not only numerous but systematically concern features expressing bone robusticity (diameters and circumference) so that they cannot be attributed to chance. We may conclude that in the structure of the femora the Abusir males compared with females had much broader variability — from fragile to quite robust build. The constitutional base might here be combined with the peristatic influences in the sense that part of the men had greater physical load.

On the whole, the variability is more often greater in males 65.5 %), less often so in females (20.7 %) and in the rest of the features there is identity between the sexes (13.8 %). The variation coefficient is smallest for females in both indices of the caput circumference in relation to the length, in males in the same feature on the left. Systematically, there are strikingly high coefficients of all weights and weight-length indices in both sexes; in males further of the anterior-posterior diameter of the midshaft of the left diaphysis of the femur, the two pilastric indices, the minimum circumference of the left fibula and both robusticity indices of the fibulae.

On the bones of the lower extremity all mean measurement and indices are greater in males than in females (with the exception of the two cnemic indices which, on the contrary, are greater in females). As for the upper extremity, the sexual differentiation is similarly striking, as shown by t-tests which proved 42 predominantly statistically highly significant, partly significant differences (i.e. 72.4 % of the total number of 58 features). The majority was to be found on the small bones (5 out of 6, i.e. 83.8 %), the tibia (12 out of 16, i.e. 75 %), and the femur (19 out of 26, i.e. 73.1 %), least on the fibula (6 out of 10, i.e. 60 %).

Table 10:6 shows that the significance of differences was not proved only for the physiological length and the transversal diameter of the midshaft and the anterior-posterior subtrochanteric diameter of the left femur, the pilastric indices of the two femora, the platymeric index of the left femur and the caput index of the right femur, further, for the transversal diameter of the right tibia, the length of the left tibia, the cnemic index and the index of robusticity of the right tibia, further, for the weight and length of the left fibula and the indices of robusticity of the two fibulae, and, finally, for the length of the left patella. In identical manner, the striking sexual differentiation of the lower extremity can be attributed, apart from the genetic base, also to the differing physical activity of the two sexes.

Let us take a brief glance at the right-left differences. Table 10:6 shows in males an almost balanced ratio of the prevalence of the right side (48.3 %) and prevalence of the left side (44.8 %), the rest concerns identical values (6.9 %). In females the prevalence of the right side is slightly more frequent (48.3 %) than that of the left side (37.9 %); the rest are identical values (13.8 %). A closer view reveals that in both sexes the femur shows far more frequently larger measurements on the left side while the tibia on the right side. The differences are, however, small and statistically insignificant.

F) PROPORTIONAL INDICES

On the basis of the greatest length of the long bones (of the physiological length in the case of the femur) five proportional indices were calculated, separately for each side and sex. They are summarized in table 10:7.

If we compare the mean values of the two sexes, they are mutually close, with the exception of the strikingly smaller values for the humero-radial, tibio-radial and intermembral indices in females. In the first one a statistically significant difference was proved on the left, in the second and third, on the right side. The results point to the fact that in males the length of the radius (and, therefore the entire forearm,) both absolutely and relatively (in relation to other bones) was greater than in females. The differing variability was shown in the humero-clavicular and femoro-humeral index; the former was greater on the right in males, and the latter on the left in females.

If we compare the lateral differences of the mean values of both sexes, the right-hand side generally shows a slight, statistically insignificant prevalence, or the values are very close. The only exception is the humero-radial index, which is greater on the left side, especially strikingly in females, but the small number of cases does not permit us to decide whether this is chance or a significant difference.

The values of the proportional indices of the series from Abusir can be compared with data of a series from the 3rd to 5th century A.D. from Wadi Qitna in Nubia (STROUHAL 1968), which shows a strong Negroid component. Only the humero-clavicular index is similar in both series, the other indices are in the Abusir series strikingly either lower (B 2, B 3), or higher (B 4, B 5), which, in the light of data by MARTIN and SALLER (1959) and OLIVIER (1960), generally expresses Caucasoid tendencies. A comparison with the values of the Pre-Dynastic cemetery from Nagada in Upper Egypt (WARREN 1898) shows, in the Abusir set, strikingly lower values of the humero-clavicular index, further, lower values of the humero-radial index and higher values of the femoro-tibial and femoro-humeral indices, which would point to a possibility of secular changes in the proportions of the Egyptian population; this will have to be tested on further and more numerous materials.

G) RECONSTRUCTION OF STATURE

To reconstruct stature we have selected from among a number of methods equations for individual long bones of the extremities, both according to DUPERTIUS and HADDEN (1951) (further: first method), and according to TROTTER and GLESER (1952) (further: second method). In the first method four bones are used (humerus, radius, femur and tibia), in the second, six bones (ulna and fibula in addition). We carried out the determination separately for both sides to judge right-left differences. We did not use combined equations, making use of the length of several bones, in view of the fact that the first series comprised isolated bones without ascertainable appurtenance to definable individuals.

In both methods special equations are available both for Whites and for Negroes. For methodological reasons we used both sets of equations. The results are presented on the basis of the equations for Whites in table 10:8, on the basis for the equations for Negroes in table 10:9. At the same time, the tables make it possible to compare the results of reconstruction of stature for individual bones, both sexes, on both sides, in both series and by both methods used.

If we compare the values of stature reconstructed according to individual bones, we can observe — when applying the equation for Whites (tab. 10:8) — a systematic difference between the higher values of stature according to the bones of the forearm and the tibia, on one hand, and the lower values of stature according to the humerus and femur on the other hand. An exception is found only by the paradoxically lower values according to the fibula in males and females on the right in the first series, in males on the left in both series, and in females on the right in the second series. This might be chance as a result of the smaller number of fibulae in both series. The differences are relatively large. According to the first method (DUPERTIUS and HADDEN) they amount, in the first series, on the average, to 2.48 cm (males) and 4.10 cm (females), in the second series to 2.84 cm (males) and 2.83 cm (females); according to the second method (TROTTER and GLESER) in the first series to 2.32 cm (males) and 3.10 cm (females), in the second series to 3.14 cm (males) and 2.45 cm (females). With the exception of the above-given reconstructions according to some fibulae, the overall range of differences according to individual bones amount from 0.21 to 5.88 cm. These differences cause the relatively large variability of mean stature, determined according to individual bones. The standard deviation, in applying the first method, reaches 1.27 cm (males) and 2.24 cm (females) in the first series, and 1.55 cm (males) and 1.89 cm (females) in the second series; in applying the second method 3.04 cm (males) and 2.66 cm (females) in the first series, 2.68 cm (males) and 1.87 cm (females) in the second series.

This shows clearly that the equations for the reconstruction of stature, elaborated in both methods on the basis of measuring American Whites, do not correspond to the proportional relations of the ancient Egyptians. The situation appears entirely different in using the equations for Negroes (tab. 10:9). The systematic difference between stature determined on the basis of the bones of the forearm and the tibia in comparison with the humerus and femur disappears. In the first method stature is higher in half the cases according to the bones of the forearm and tibia, in the second half, by contrast, according to the humerus and femur. In the second method 53.1 % of cases have greater stature according to the bones of the forearm and the tibia, by contrast, 46.9 % according to the humerus and femur. The differences are generally small and range, on the average, in the first method, between -0.73 cm (i.e. prevalence of the values of stature according to the humerus and femur) and 0.84 cm (i.e. prevalence of values according to the bones of the forearm and the tibia), in the second method between -0.04 cm and 0.82 cm. The range of differences according to individual bones amount from -3.19 cm to 3.94 cm. Likewise the variability of average of stature, determined according to individual bones, is much smaller when the equations for Negroes are used. The standard deviation amounts to 0.50 cm (males) and 1.13 cm (females) in the first series when the first method is applied, to 0.90 cm (males) and 0.87 cm (females) in the second series; applying the second method, it reaches 1.93 (males) and 1.75 cm (females) in the first series, and 1.50 cm (males) and 1.01 (females) in the second series.

The comparison convincingly shows that the proportions of the ancient Egyptians were closer in proportions to the present-day American Negroes than contemporary American Whites. We stated a similar situation already in regard to the tables by TROTTER and GLESER (1952) for series of C-Group and Pan-Graves from Sayala in Egyptian Nubia (STROUHAL and JUNGWIRTH 1984).

As concerns sexual differences, first of all, the negative results of all F-tests show a similar variability of the reconstructed stature in both series by the application of both methods and both sets of equations. On the other hand, the t-tests show, in using the equations for Negroes for the majority of bones (tab. 10:9), in applying the equation for Whites for almost all bones (tab. 10:8) significant and highly significant differences (on the level of $p = 0.05$, resp. $p = 0.01$). In one case, applying the equation for Whites, and in five cases, applying the equation for Negroes, the t-values came close to the threshold of significance ($p = 0.05$). The result, therefore, corresponds to the expectation that the difference in stature of both sexes is mostly statistically highly significant.

As to right-left differences in the reconstructed stature according to values of the right side bones, is, in the majority of cases, a little higher than stature according to values of the left side bones, using both sets of equations and both methods. The differences in the reconstructed stature according to individual bones range from 0.03 to 5.23 cm according to the equation for Whites and in the range 0.03 to 4.06 cm using the equation for Negroes. By contrast, in 31.2 % of comparisons on the basis of the first method, and in 41.7 % of comparisons according to the second method, higher values of stature were reconstructed according to the bones of the left side. The overall range for individual bones varied from 0.34 to 4 cm using the equation for Whites and from 0.11 to 3.40 cm using the equation for Negroes. The average right-left differences of the reconstructed stature were in the same time, small. In using the equation for Whites they amounted, according to the first method, in the first series to 0.24 cm (males) and 1.46 cm (females), in the second series to 0.63 cm (males) and 0.55 cm (females), according to the second method, in the first series to -0.06 cm (i.e. a slight prevalence of the left side in males) and 1.26 cm (females), in the second series 0.19 cm (males) and 0.41 cm (females). In using the equation for Negroes the differences given in the same order are very similar (0.36; 1.35; 0.36; 0.46; 0.00; 0.66; 0.66; 0.27 cm). It can be deduced from this that the right-left differences in our material did not greatly influence the reconstructed stature.

The values of the reconstructed stature in both series (first series from inside the Mastaba, second from around

the Mastaba) are generally similar or identical, regardless of the type of equation or method used. In males they differ only in the slightly smaller values of stature reconstructed according to the left humerus and right femur of the second series and according to the right fibula of the first series. In females, they differ in the lower values according to the left humerus of the second series, the higher values according to the right and, on the contrary, lower values according to the left forearm bones of the first series, lower values according to the left femur of the first series, higher values according to both tibiae of the first series and lower value according to the right fibula of the first series. These are non-systematic and generally small differences (smaller when using equations for Negroes). The average reconstructed stature appears practically identical in the first and the second series, both in using the weighted or unweighted mean of the reconstructured statures according to individual bones, the equation for Whites or for Negroes, and the first or second method. It can thus be concluded that our sexing carried out for the scattered finds of isolated bones of the first series was correct in most cases so that the elaborated results correspond to that of the second series, where sexual determination was based usually on almost complete skeletons. It simultaneously confirms the repeated statement on the morphological identity of the populations from both parts of the cemetery.

Further, it is interesting to compare the results of the two methods used. In both types of equations we can see, systematically and without exception, higher values of the reconstructed stature according to individual bones in both sexes and both series, in the first method. The differences range around 2.1 cm in using the equations for Whites and 3.1 cm in using the equation for Negroes.

Finally, let us compare the results on the basis of the type of equation used. There again we find higher values of the reconstructed stature in using the equation for Whites without exception and systematically in both methods according to individual bones, in both sexes and both series. The differences amount to some 3.8 cm for males and 1.8 cm for females by the first method, and cca 4.4 cm for males and cca 3.2 cm for females by the second method.

The results of the reconstruction of the stature of the joined series from Abusir according to equations for Whites and Negroes and according to the Dupertius and Hadden method, on the one hand, and that of Trotter and Gleser, on the other, are summed up in table 10:10 in confrontation with data on stature of recent inhabitants of Abusir (STROUHAL and REISENAUER 1963) and two further population samples from the close vicinity (CRAIG 1911). The stature of the present-day inhabitants of Abusir is closest to the data on the reconstructed stature according to the method for Negroes given by Trotter and Gleser. With regard to data on the population samples from the vicinity, account should be taken — as the upper border of the possible stature of our series — of the data given by the Negro equations in the Dupertius and Hadden method. The results according to the formula for Whites in both methods must be regarded as too high, influenced by the differing proportional relations of the initial material for both equations, recent Americans. In conclusion it can be stated that the mean stature of the series from the secondary cemetery in the Mastaba of Ptahshepses lay, between 165—168 cm in males, and 154—157 cm in females. The range of individual values varied between 154 and 184 cm for males, and between 143 and 168 cm for females.

CRANIOSCOPY

A) DESCRIPTIVE MORPHOLOGICAL FEATURES

The descriptive morphological features were evaluated either verbally or with the aid of comparative schemes given in the works of MARTIN and SALLER (1959), EICKSTEDT (1944), and DE VILLIERS (1968). The method used was described in detail in the work of STROUHAL and JUNGWIRTH (1984).

Results elaborated for adults[48] of both sexes are given separately in tables 11:1 to 11:3. Of the features of the frontal norm (table 11:1), robusticity of the skull, which is generally medium to big in males, slight to medium in females, shows a clear sexual difference. On the contrary, the tubera frontalia are developed most often slightly in males and medium in females. The tendency towards a front bombé is more striking in females than males. In both sexes the orbita most frequently has a rectangular shape, but in females the square and trapezoid shape is present more often than in males. The axis of the orbita is in both sexes usually slightly oblique, in males followed by oblique, in females by horizontal direction. The upper margin of the orbit shows a clear sexual difference with greatest representation of medium thick in males, thin in females. The shape of the nasal bones corresponds most often to Hovorka's 1st degree in males, and to the 2nd degree in females. The shape of the apertura piriformis is roughly similar in both sexes, most often represented by the cordiform category. The lower margin of the apertura piriformis according to Martin and Saller is most often anthropin in both sexes, the fossae praenasales and sulcus praenasalis being slightly more frequent in males than in females. In our evaluation the lower margin is formed by a crest in similar frequency in both sexes, in males there is slightly more of smooth form and of a combination of angular and smooth forms, in females clearly more of angular form. The depth of the fossae caninae is more often medium in males, whereas in females also the categories of big and slight depth are more often present. The development of the processus marginales shows in males a tendency towards more frequent presence of medium and big categories, in females, by contrast, towards the slight category.

Among the features studied in the lateral norm (tab. 11:2), the spina nasalis of males is more often medium to big, in females small to slight; the spina of Broca's 5th degree was not found. In the overwhelming majority of cases in both sexes the nasal back is concave in the upper part, convex in the lower part, less often straight. In more than one third of cases the lower half was not preserved. Backs that are straight in the upper part, and also straight or convex in the lower one are, on the other hand, rare. In some cases here, too, the lower half was missing. The nasofrontal transition in males forms, most often, an obtuse or very obtuse angle, in females a slight arch, very obtuse angle or almost straight line. The arcus superciliares belong to the sexually strikingly differentiated features with a prevalence of Eickstedt's 3rd to 4th degree in males, 1st to 2nd degree in females. Similarly, the glabella shape mostly reaches Broca's 3rd degree, a transition from the 2nd to 3rd, or 3rd to 4th degree in males, the 1st degree followed by the transition of the 1st to 2nd and 2nd degree in females. The extreme 5th and 6th degrees were not found even in males. The profile of the frontal scale in males is most often oblique or medium, in females perpendicular or medium. The profile curve of the postbregmatic region is most often horizontal in males, less often so in females, on the contrary, more often than in males their profile curve is ascending or arched in convex manner. A concave depression of the profile was found in about one sixth cases in both sexes. Obelic flatness is absent in half the cases of both sexes; in the second half we can observe a tendency towards a greater flatness in males than in females, where a slight flatness prevails. Similarly in lambda flatness there is a shift in males as against females to a more intense appearance of this feature. On the contrary, we did not observe any sexual difference in the bulge of the occipital scale: the slight bulge followed by the medium, is most frequent, no bulge or big bulge rare. Striking sexual difference can again be observed in the protuberantia occipitalis externa, which, in males, most often reaches the 2nd degree, followed by the 1st and 3rd degree of the Broca's scheme, in females the 1st degree, followed by the zero and the 2nd degree; the extreme 4th and 5th degrees did not appear in the series. On the contrary, females compared with males show a trend towards the more frequent appearance of slight, possibly medium prominence of the cheek bones. It is surprising that in the development of the lineae temporales the frequency of the

48 In males from the age of 20, in females including three individuals at the age of 19 (A 48) and 19.5 years (I 405, J 1896).

medium category — regardless of whether the line is formed only in the frontal or in the frontal and parietal region — is only slightly greater in males compared with females. The sexual difference is much more striking in the cristae supramastoideae, where, in males, there is a large and medium development, in females slight and medium development.

Of the features of the vertical norm (tab. 11:3), the outline of the skull according to Sergi is roughly identical in both sexes with a dominance of ovoid (2) and rhomboid (5) form. A smaller number of cases have birsoid (6), pentagonoid (3), elipsoid (1) and sphenoid (7) outlines. The tubera parietalia showed a greater development in females compared with males: in the former the medium and big categories prevail, in the latter the medium and slight.

In the occipital norm the outline is likewise without sexual difference: more than half the cases have house-shaped outline, about one quarter shows a transition to the tent shape and the rest to the bomb shape. The sulcus sagittalis, in indicated and developed forms, was found in about one quarter of cases of males, one fifth of females; a slight crista sagittalis in about one sixth of cases of both sexes. A striking sexual difference is again to be seen in the development of the muscular relief on the nuchal plane, where, in males, medium development predominates and in one fifth of cases even the category of outstanding development is present, while, in females, slight development leads, and one fifth of cases shows the medium category.

From among the features of the basal norm the shape of the upper dental arch was recorded, which, in both sexes, is ellipsoid in two thirds of cases. The remaining third mostly shows in males an angulated shape in the region of the canines with diverging rows of premolars and molars, in females a parabolic shape. The depth of the palate is, in both sexes, in more than one half of cases medium, in females, the deep palate appears more often than in males and only in females is there a low arched palate. By contrast, more males have palates lowered by atrophy of the alveolar part of the jaw.

Of the mandibular features, there is again a striking sexual difference in robusticity, which is big to medium in males, slight to medium in females. Similarly males have outstanding to medium muscular relief, females medium to slight. Eversion of the gonial region — outstanding and indicated — is present in four fifth of male but only in one third of female skulls. Only in females does there appear in about one sixth of cases the contrary, the inclination of the gonial margin inwards (inversion). The shape of the lower dental arch is mostly parabolic, in males barely in two thirds, in females in more than three fourth of cases; the other types are a little more frequent in males than females, where the romanesque arch is absent. The chin in males reveals more often angulated shape (type 4, followed by type 3 of De Villiers), in females the pointed chin prevails (type 5), followed by the rounded chin (type 2). Females show a clear tendency towards bigger chin prominence (3rd degree followed by 2nd) than males (2nd degree followed by degree 3 and 1). The leading occlusion type of the series is labidodonty.

B) EPIGENETIC FEATURES

For technical reasons it was not possible to ascertain the entire range of discontinual epigenetic features suggested by BERRY and BERRY (1967); 13 of their 30 features were dealt with. In four of these features we decided to scan frequency on both sides in view of the frequently observed individual right-left differences. In addition the appearance of wormian ossicles in the sagittal suture was studied, of the pteric variations according to the MARTIN and SALLER scheme (1959) stenokrotaphy was added, the appearance of the os incae and the sutura mendosa was traced, in the foramen supraorbitale also its complete absence, i. e. the non-development of the complete aperture nor the notch in its place, was recorded separately for the right and the left side and finally the occurrence of the os japonicum[49] was marked.

In epigenetic features a number of recent studies have ascertained sexual, age and right-left differences (CORRUCINI 1974, SAUNDERS 1978). In consequence frequencies of 24 scanned features are given in table 11:4 separately for males and females over 15 years, further in total, and for children up to 14 years. Epigenetic features of children, to whom chapter 13 is devoted, were included in the table for the interesting comparison of their frequencies with those of adults and juveniles[50].

Table 11:4 shows closeness in the frequency of most features in both sexes. Strikingly different frequency is, however, found in 41.7 % of features and that in metopism (three times more frequent in females than males), the occurrence of the epipteric bone (twice as frequent in females than males), stenokrotaphy (found only in males), the sutura mendosa (more frequent in males), the tuberculum praecondylicum of both types (more frequent in females), the absence of the foramen supraorbitale (more frequent in males), the occurence of the complete foramen supraorbitale (more frequent in males on the right, in females on the left). The differences found are a further argument for evaluating epigenetic features for each sex separately.

Of the four features given twice in the table in view of laterality, two show clearly differing results. This is the complete foramen supraorbitale developed in males more than twice as frequently on the right than on the left and, by contrast, in females more than three times as frequently on the left than on the right; further, the foramen frontale accesorium, which, in both sexes, is more than twice as frequent on the right than on the left. Of the other features scanned on both sides of the skull we stated right-left asymmetry also sporadically, but the differences were not large and, therefore, we omitted their tabular depiction. The results point out that laterality cannot be ignored in the study of epigenetic features even if its significance does not reach the importance of sexual differences.

49 The lower part of the zygomatic bone completely separated by an anomalous suture or a partial suture.

50 For lack of space we have omitted the frequency of epigenetic features separately for both series. In the overwhelming majority of features the results were close, with the exception of 3 features (12.5 %) in males and 4 features (16.7 %) in females.

The greatest differences in frequency were observed in comparing children with adults and juveniles. They recall a profound difference between two genetically differing series. Only a few features, the zero frequency of the bregmatic bone, the relatively little deviating frequency of the lambdoid ossicles and the ossicle at the asterion, the zero frequency of the frontotemporal articulation, the almost negligible presence of the os incae in adults, and none in children, the frequency of the foramen frontale accesorium of the left and the absence of the os japonicum can be considered practically identical in both age groups. The other 70.8 % of features in our series show striking age differences.

Let us try to clarify the differences found. In the case of metopism it may well be that the missing cases of children with open suture are to be found among the ten children whose metopism was evalued as physiological in view of their young age (up to 1 1/2 years). It is possible that in part of these there might be an innate disposition for the persistence of the suture. For the strikingly low frequency of the wormian ossicles in the sutures and in places where three bones touch it should be assumed that the ossicles develop during the post-natal growth of the skull bones. In the case of stenokrotaphy it is probably a chance result caused perhaps by the small number of cases in children. In the case of the sutura mendosa its half incidence in adults compared with children can be explained by its fusion during ontogeny. Similarly, the high frequency of the foramen of Hushke in children probably depends on the fact that it is a developmental residium of a slit in the closing annulus tympanicus, which gradually disappears in the course of childhood so that in adulthood it survives only in some persons — in our series in roughly one sixth. Less clear are the reasons for the differences in the tuberculum praecondylicum of both types. One quarter of children lacking the least indications of the supraorbital notch in comparison with 8 % males and 3 % females with that anomaly can be explained by the fact that the notch develops in some individuals in the course of the post-natal period. The same is suggested by the low frequency of the complete foramen supraorbitale in children compared with its 2 1/2 to 3 times as great occurrence in adults. Clearly in some individuals the original slit closes in the period of the post-natal growth and a supraorbital aperture is thus formed. On the other side, the difference between the low frequency of the foramen frontale accessorium in children compared with adults on the right side cannot be easily explained (on the left the frequency in both age groups is similarly low).

These results provide sufficient argument in favour of the conclusion that even discontinual epigenetic features are in reality continual, and that they are formed in the course of ontogenesis, including its post-natal stage. In this manner these features basically do not greatly differ from other anthropologial features, be they metric or descriptive. For that reason in future the frequency of epigenetic features found in children should not be linked with frequencies characterizing adults.

C) MORPHOLOGICAL REMARKS

Apart from the systematically scanned features more or less important morphological peculiarities were observed in certain individuals.

As to the general shape of the skull, in the case of a female 30—40 years of age (I 287) a deformation was found in the sense of prolongation, narrowing and increase of the height of the skull. By contrast, the skull of a 28—32 year old female (I 294/1) was low and broad with a flattened base. In both cases post-mortal influences were probably involved — pressure of the overlying material on the skull. In the same two females a mighty as if doubled processus mastoideus was found divided by a suture with a slit.

Post-mortal pressure likewise caused the assymmetry of the skull base of a male, 30—35 years of age (I 457) c. 15 mm to the left and 10 mm downwards and perhaps also the overlarge bulge of the surroundings of the foramen occipitale downwards in the case of a 28—32 year old male (J 1628) and a 25—30 year old female (I 461).

The low, strongly profiled "cromagnoid" face of a 25—30 year old male (J 1965, pl. 47) differs from the morphology of the other individuals (selected examples of other males are shown on pl. 38—46, of females on pl. 48—57, of children on pl. 58—63).

In the case of a 28—32 year old male (I 393) strongly flattened occipital condyles can be seen, which do not project above the level of the surroundings. In the case of a 30—40 year old male (J 1894, pl. 46:2) the frontal margin of the left sutura squamosa is doubled. In the case of a 30—50 year old male (A 36/6 a, pl. 64:1) thick rounded ridges stretch on both sides from the tubercula mentalia until below the foramina mentalia.

CHAPTER 12

OSTEOSCOPY

In view of the relatively small number of descriptive features scanned we decided not to deal separately with purely morphological or dimensional features, on the one hand, and epigenetic features (FINNEGAN 1978) characterized by presence or absence, on the other hand. They are arranged together according to the main body regions and individual bones, separately for each sex, and in case of paired occurrence separately for each side. As in the case of metric features, we evaluated them exclusively for adults (males from 20, females from 19 years of age), to exclude the influence of growth differences. An exception is made for the double foramen transversarium, traced also in juveniles from the age of 15.

A) DESCRIPTIVE MORPHOLOGICAL FEATURES OF THE TRUNK

Of the morphological features of the trunk[51] given in table 12:1, we present the occurrence of the double foramen transversarium of the cervical vertebrae among individuals of the second series (including a few burials D of the first series). This is the formation of the fine transversal bone lamina, which divides the foramen transversarium into a larger anterior and a smaller posterior opening (the latter named by Struthers in 1892 foramen laterale posterior; pl. 64:2 shows it on two lower vertebrae, C_5 and C_6). Sometimes only spines projecting towards each other are developed but without a connection; this can be considered as double foramen in the making (incomplete foramen). (On pl. 64:2 spines can be seen on the second vertebra from the top, C_4). Both these variations were evalued as presence of feature.

Most often, in one half to two thirds of cases, we observed (tab. 12:1) a double foramen transversarium on C_6, further on C_5, less often on C_4 and C_7; and only on isolated occasions on C_3. On 54 atlases (C_1) and 58 epistrophei (C_2) the feature was absent, which corresponds to the findings by LE DOUBLE (1912:34). As to sexual difference, the double foramen transversarium on C_6 occurs more often in males than females, on C_5 it shows similar frequency in both sexes, on C_7 greater in males than females, on C_4, by contrast, greater in females than males and on C_3 it was found only in one female on the right. We regard these differences rather as random. As to lateral difference, in both sexes there is a trend towards more frequent occurrence of double foramen transversarium on the right. The symmetry and asymmetry of the feature was studied in 61 persons. At least one asymmetrical pair was found in 18.8 % of males (6 out of 32) and 34.5 % of females (10 out of 29).

If we link the mentioned data for both sexes and add to them data for both sexes derived from the study of the scattered vertebrae of the first series (burials A) we get an overall frequency for the entire material from Abusir. The order remains the same as in the partial series for both sexes of the second series (including all D burials). Greatest frequency of the double foramen transversarium is shown on C_6, on the right, 49.3 % (35 out of 71 cases); on the left, 43.7 % (31 out of 71). This is followed by C_5 with 28.6 % on the right (20 out of 70) and 23.9 % on the left (17 out of 71), C_4 with 11.5 % on both sides (9 out of 78) and C_7 with 9.1 % on the right (6 out of 66) and 7.4 % on the left (5 out of 68). The smallest frequency was found for C_3 — 2.8 % (2 out of 72).

We used data from LE DOUBLE (1912:33) for a comparison of this feature, which is rarely studied, with its frequency on cervical vertebrae of 200 Frenchmen (Tourangeaux). The author put both sexes together and we have likewise linked his data on complete and incomplete double foramen. Le Double's frequencies are a little lower for C_6 (39 % on the right, 40.5 % on the left), they are markedly lower on C_5 (8 % on both sides) and a little higher on C_7 (11 % on the right, 10.5 % on the left), lower for C_4 (5 % on both sides) and a little higher on C_3 (4 % on the right, 3.5 % on the left). The differences in frequency show the importance of this feature for population studies.

The usual transitory vertebra[52] is Th_{12}. In our second series, however, we found a full third of cases of a cranial variant, a transitory vertebra Th_{11}, by contrast only in isolated cases a caudal variant, a transitory vertebra L_1. The sexual difference is insignificant.

If we merge the data for both sexes and add to them the data for both sexes gained from the study of the scattered vertebrae of the first series (burials A), we can determine

51 This section includes also the hip bones for their close relation to the sacrum and thus to the axial skeleton.

52 The upper articular processes have the same shape as those of the thoracic, the lower as those of the lumbar vertebrae.

the frequency for the whole material from Abusir. The share of the cranial variant drops to one quarter — 25.6 % (20 cases out of 78), the caudal variant occurs a mere 5.1 % (4 out of 78), the majority is formed by the normal type of transitory vertebra Th_{12} — 69.2 % (4 out of 78).

Likewise the occurrence of a six-element sacrum is represented in males of our series in more than one third by a sacrum prolonged by coalescence of the first coccygeal vertebra (pl. 64:3, 64:4). In females this occurence is, strangely enough, far less frequent. Only in single case of male D 334a was a six-element sacrum formed by coalescence of the sacralized fifth lumbar vertebra, in female I 456 there was a one-sided sacralization of L_5 on the right (pl. 64:5), and in male J 1947 a rare seven-element sacrum formed by the sacralization of both L_5 and Cc_1. By contrast, no four-element sacrum occurred and only in one case (male I 337) the vertebral column was prolonged by a lumbalized S_1, followed by a five-element sacrum containing segments S_2 to Cc_1.

The sacra in our series usually have an unclosed caudal end of the canalis sacralis. Most often the sector with the missing crista sacralis mediana reaches, in both sexes, to the level of S_4 or S_3 (more often in females than males), further, to level S_5 (more often in males than females) and less usually to S_2 (more often in females than males). On rare occasions, a complete hiatus canalis sacralis is formed (see chapter 14, sub G). The oppositely oriented unclosed cranial end of the canalis sacralis was observed in the series only occasionally to borderline S_1—S_2 (in two males, 5.3 %).

In three quarters of cases the maximum concavity of the frontal surface of the sacrum is situated at level S_3, the rest, in males, is divided to S_2, S_4 and a flat sacrum almost without concavity (pl. 64:6—7), while in females concavity of type S_2 prevailed over S_4.

Striking sexual differences were found in the size of the apophyses of the hip bones (crista iliaca and tuber ischiadicum). In males large size prevails significantly over medium, in females in over one half of cases the characteristic size is medium, in one third slight and in the rest large. The lateral differences are insignificant.

Likewise we can observe a striking difference between the sexes in the sulcus praeauricularis. In males this feature was absent on the left in half the cases, and on the right in two thirds; less than half the cases on the left and one third on the right were developed slight to medium. By contrast, in females on the right a clear bimodal division of frequency can be observed with a higher top of the deep and large sulcus and a lower top of the slightly marked sulcus. Fewer cases are in the categories of medium sulcus and of absence of the feature. On the left bimodality is missing and the individual categories are represented roughly with identical frequencies with the exception of higher frequency of the medium sulcus. It can be assumed that these results reflect the fact that the majority of females had a large or medium deep sulcus praeauricularis as a result of several births (multiparae), in a somewhat smaller number of females the development of the feature remained on the "male" level (nulli-, or primiparae).

A systematic study was devoted to pitting laterally of the rear margin of the symphysis pubica. None were found in 28 males and only 2 in 13 females (15.4 %). This indicates that their frequency was small among the ancient Egyptians compared with other populations, which would suggest a different (lighter ?) course of parturition.

The shape of the incisura ischiadica was depicted graphically for all surviving hip bones and served as one of the significant criteria for sexual determination. The ambiguous shape on the borderline between the typical male (narrow arch in the shape of letter J) and the female (broad arch in the shape of an L) was found only rarely.

B) DESCRIPTIVE MORPHOLOGICAL FEATURES OF THE UPPER EXTREMITY

Among the descriptive morphological features of the upper extremity, given in table 12:2, we scanned on the clavicle the morphology of the impressio ligamenti costoclavicularis. We became convinced of the significance of this feature, which we regard as functional, according to series from various historical periods from Sayala, Egyptian Nubia (STROUHAL and JUNGWIRTH 1980, 1984). In the Abusir series a very significantly sexual and at the same time, right-left difference was proved. The shallow to deep pit, often with walls that are jagged probably as the result of excessive straining of the ligament, were found almost exclusively in males. On the contrary, in females the type of the demarcated plane with a smooth or slightly rough surface prevails, with the margin extended, on one or more sides, to a slight edge or crest. Plate 65:1 illustrates the two differents types, showing at the bottom the pit type in a 23—27 year old male (I 411), at the top the demarcated plane of a 23—27 year old female (J 1970). In females, this is followed by the absence of any traces of impression. At the same time, within both sexes, the predominance of more intensive forms of this feature on the right rather than on the left side can be observed. By way of illustration we include the clavicles of a 25—30 year old male (J 1965) with the pit type on the right and the distinct flat area on the left (pl. 65:2). It is our opinion that the differences mentioned depend on the differing physical activity of the two sexes and the predominantly right-handedness of the members the Abusir community (see also chapter 10, sub D).

In conformity with this, striking sexual differences are shown by features scanned on the humerus, among which belongs the development of tuberositas deltoidea. In almost two thirds of males its strong degree prevails, which is present in only one third of females, because the majority of them have medium or slight development of this feature. The right-left differences are, however negligible. Examples of extreme bulge of the tuberositas deltoidea in males A 29/1—2—L 1, I 395, I 466 and J 1761 are given on pl. 65:4—6.

Likewise the crista tuberculi maioris, scanned in its distal half at the place of attachment of the musculus pectoralis maior, shows more frequent strong development connected usually with the formation of a longitudinal jagged cleft medial of the crista in males (pl. 65:3, A 40/1—P 1)

than in females, among whom the medium degree of development of this feature was present. A difference in laterality was observed only in males, among whom the crista is stronger on the right and of medium degree on the left (a reversed example of side difference is shown on pl. 65:7, I 444).

We consider the septal aperture, i. e. the perforation between the fossa olecrani and the fossa coronoidea, a feature conditioned by the interaction of the robusticity of the humerus and its functional exertion; in this we differ from authors who include it among epigenetic features (FINNEGAN 1978). In accordance with our conception we have observed a two and a half times greater frequency in females than males and a slightly more frequent occurrence on the left than on the right.

On the radius we scanned the relief conditioned by the impressions of the tendons on the dorsal side of its distal end. The sexual difference of this feature is very significant. In more than half the males the relief is medium deep and in a further third very deep, while in three fifth of females it is slight and in more than one third medium deep. In males, at the same time, we can observe a tendency towards a greater development of the feature on the right, in females the right-left differences are practically indistinguishable.

A less significant difference between the two sexes is shown by the degrees of curvature of the radius. In more than half of the males the medium degree prevails, followed by the strong degree; in females both these degrees occur less often, and the slight degree is present more noticeably, particularly on the left.

A significant sexual difference is found again in the development of the muscular relief on the ulna, which in males is more often strong, followed by medium, while in two thirds of females the medium degree prevails, followed on the left evenly by the slight and the strong, on the right with a predominance of the strong over the slight. In males right-left differences are not apparent. An example of a uniquely strong development of the crista musculi supinatoris is shown on pl. 66:1 in a 40—50 year old female (J 1971), anomalously on the left side.

The degree of curvature of the ulna shows less significant sexual differences. In both sexes the medium degree prevails in more than half the cases, followed by the strong degree, in males in more than a third of cases, in females more on the left than the right. By contrast, the slight degree is present more often in females than males.

From among the occasional morphological observation on the upper extremity we quote a single example of a beak-shaped processus entepicondylicus in male J 1628, only on the left. The crista interossea of the radius is on both sides extended in a lobe-shaped manner in male J 1894 and female I 324, only on the right side in male I 466. The tuberositas radii is flattened with an extended edge and a smaller crater-shaped pit only on the right in male I 418, jagged like a cauliflower only on the left in female D 135.

53 They form a narrow strip on the anterior edge of the distal end of the tibia.

C) DESCRIPTIVE MORPHOLOGICAL FEATURES OF THE LOWER EXTREMITY

The larger part of the descriptive morphological features of the lower extremity, summed up in table 12:3, is devoted to the femur. In the development of the tuberositas glutea almost two thirds of males show the strong, the same number of females the medium degree. In males less than one third is of medium, the rest of slight degree, in females about one fifth is of strong, and a little less of the slight degree. The right-left difference can be ignored in males; in females on the right more of the strong and fewer of the slight degree in comparison with the left side may be observed.

In males the trochanter tertius is formed in almost one third of cases, in females on the right in one fifth, on the left only in 8 %.

The fossa hypotrochanterica is mostly missing identically in both sexes. The frequency of its slight development is also similar. Almost exclusively in males there were a few cases of a medium and deep degree with a predominance of the right over the left side.

The tuberculum adductorium is likewise most often absent, more in females than males. The category of slight development is similar in both sexes. Medium development is far more frequent in males than females, and we can find several cases of strong development only in males. In males we can observe a tendency towards a greater development on the right, in females on the left.

The pilaster is developed in males in half the cases and in females in two third to three quarter cases to the 3rd degree of the Martin and Saller scale. Males show the 4th degree more than females, females on the left the 2nd degree more than males (paradoxically less on the right). In males there is a tendency towards a higher degree on the left, in females on the right.

On the tibia the development of the linea musculi solei belongs to functionally important features. The sexual difference here is very significant even if its development does not reach the extreme degree so often observed in males of the Late Roman to Early Byzantine Period at Sayala (STROUHAL and JUNGWIRTH 1980). In about one half of males the linea is medium developed, in two thirds to three quarters of females there is a slight linea. In a further third of males we observed a slight, in a fifth of females a medium linea, and in the rest of the cases a strong linea, more often in males than females. Examples of strongly developed lineae forming ridges are given for the left tibia in male A 40/B—L1, pl. 66:3—4) and the right tibia in male A 42/A—P1, pl. 66:5—6). On rare occasions there occurs a deep groove in place of the linea musculi solei, which is normally present in children; an example is given of a 30—40 year male D 334 (pl. 66:2). In males the strong category and in females the medium to slight categories appear slightly more often on the left.

The squatting facettes of the tibia, on the other hand, do not show clear sexual differences. They are well developed in one fifth to one third of cases, slightly in two fifths in males on the right and in females on both sides and in something over on quarter of males on the left.[53]

In grooving of the fibula greater intensity of the feature appears in males than females. The medium deep grooving is characteristic for less than half the males and more than half the females. Deep grooving appears about twice more frequently in males than females. By contrast the frequency of slight grooving was not greatly different in either sex. At the same time, a slight tendency towards the higher degree can be observed on the left, similar for both sexes.

In curvature of the fibula we find, in males, the same, roughly two fifths share of the strong and medium degrees. In females the medium degree dominates in more than half the cases, while one third falls to the slight degree. The remainder in males is of the slight, in females of the strong degree. A tendency to a higher degree on the left is indicated only in males.

Worth mentioning among occasional morphological observations on the lower extremity is the occurrence of an oval area of the exposed spongiosa on the anterior surface of the neck of the femur (the "Allen'pit") only on the left in male I 337, on both sides in females I 412 and I 460 and on the left in female J 1946 (the right side damaged). A tibia flattened from both sides in sabre-like manner was a frequent find in the series, e. g. on the left in male A 36/5-2 (pl. 67:5—6) or on both sides in males D 130 a (pl. 67:1—2), D 344 or I 466 and in females J 1958, J 1961 and J 1964. A strikingly thin structure and greater curvature was found on the tibia of female A 21—P 2 (pl. 67:3—4) and deep grooves on the tibial sides of the proximal ends of both fibulae were observed in male D 334 (pl. 66:2).

In summing up it can be stated that osteoscopic features also showed more or less significant sexual differentiation, conditioned genetically and functionally, in the majority of them (with the exception of the double foramen transversarium on C_5 and the squatting facette of the tibiae). On the other hand, unequivocal differences in laterality were only shown on the upper extremity in the sense of accentuation of the right side.

CHAPTER 13

GROWTH OF CHILDREN AND JUVENILES

(With the statistical collaboration of O. SOUDSKÝ)

A) CRANIOMETRY

In children aged 5 to 14.9 years a narrowed repertoire of 20 dimensions and 11 indices was recorded; in infants aged 0 to 4.9 years only 11 dimensions and 6 indices could be used in view of the bad condition of the surviving material, and even so rather sporadically. These are classical dimensions and indices of the MARTIN and SALLER (1957) technique. In juveniles aged 15—19 years the whole scale of dimensions and indices was observed as in adults. The results are given in age succession in tables 13:1, 13:2 and 13:3. The marking of dimensions and indices corresponds to tables 9:3—6. The tables contain craniometric values of a total of 60 children and 7 juveniles.

Of individual dimensions the length of the skull (1) is given in only 21 data, practically from 5.5 years upwards (and of a 3.5 year old child). The range of data is considerable and in graphic evaluation the growth trend appears insignificant. On the other hand, the breadth of the skull (8) is given for a series of 32 data from the age of 2.5 year showing significantly apparent growth. The minimum breadth of the forehead (9), given in 30 data practically for the entire age scale under observation, shows even more significant growth, which seems to be concentrated into the period up to 10 years, after which stagnation can be observed. The height of the skull basion-bregma (17), present in only 14 data from 5.5 years upwards, shows only insignificant growth tendencies. The horizontal circumference of the skull (23), given for 20 individuals from the age of 5.5 years (and for a 3.5 year old child), shows likewise great dispersion and relatively little growth.

Of the indices the cranial index (1), represented in 19 data from 5.5 years (and a 3.5 year old child), shows immense dispersion without visible age changes. The length-height index (2) as well as the breadth-height index (3), both based on only 14 data from 5.5 years upwards, have a similar character. By contrast, the transversal frontoparietal index (13), represented in 21 data, shows a growth tendency concentrated, as for the smallest breadth of the forehead, into the period up to 10 years of age.

The breadth of the face (45) could be ascertained only in four individuals between the ages of 7.5 and 9.5 years and in two juveniles; both groups show a striking difference. The height of the upper face (48), for which we have only 13 data from 4.5 years upwards, shows clear growth despite relatively considerable dispersion. The breadth of the nose (54), given in 20 data from 3 years upwards, shows, on the whole, regular growth with a smaller dispersion of values. There is a similar increase in nasal height, represented by 15 data from 4.5 years upwards. The maxilloalveolar breadth (60), observed on 31 data, shows clear growth to the age of 10, later, however, it seems to stagnate. By contrast, growth of maxilloalveolar length (61) scanned in 27 individuals, continues until 17—18 years. The bicondylar breadth of the mandible (65) like the length of the mandible (68,1) represented in 26, respectively 34 data, show rapid growth till 2 years, later slowing down but likewise continuing until 17—18 years.

Of the indices let us quote the index of the upper face (39) represented only in 4 individuals between 7.5 and 9.5 years, and two juveniles. Between the two groups there is a visible growth of the index value. The nasal index (48), given for 14 persons from 4.5 years upwards, shows immense dispersion without more significant age changes. Clear age changes are not noticeable either for the transversal (51.1) and vertical nasofacial index (51.2) represented by 7, respectively 12 data, and showing likewise considerable dispersion. The maxilloalveolar index (54), resting on 27 data, shows immense dispersion until 11 years and, at the same time, a noticeable decline with advancing age. On the other hand, the breadth-length index of the mandible (62), calculated for 26 individuals, rises clearly with advancing age, and up to 8 years the values are grouped in interesting manner at two levels, separated by a gap.

The other dimensions and indices are present only in isolated cases, which do not make evaluation of growth possible and are published (tab. 13:2—3) for documentary purposes.

B) OSTEOMETRY

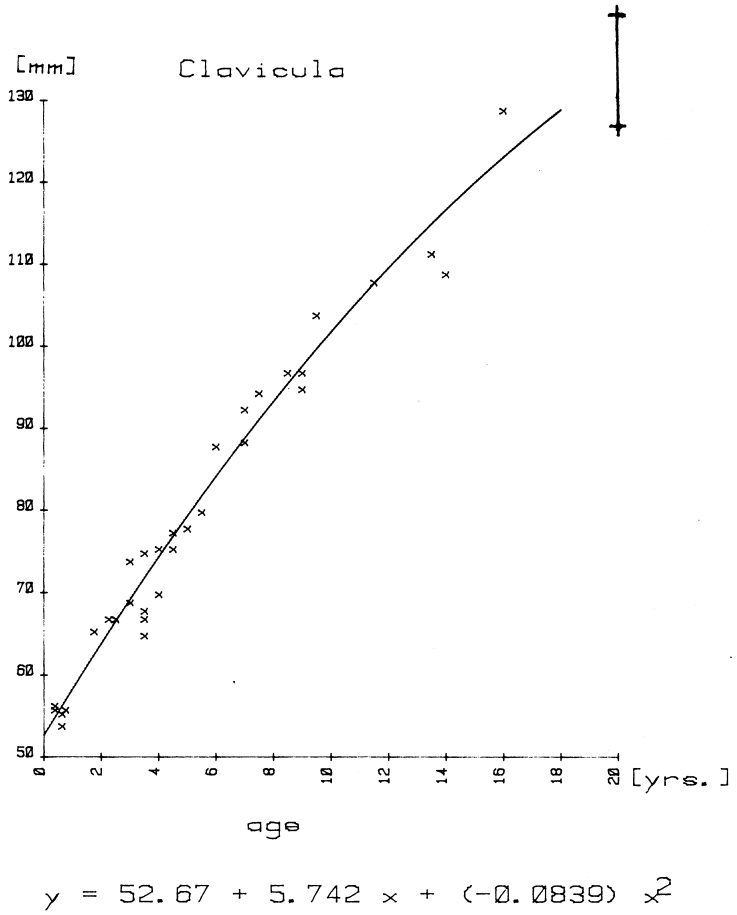
The length of the diaphyses of the long bones of the extremities[54], the dimensions of the developmental parts of the hip bone and statures reconstructed on the basis of the

54 In juveniles the length of the bones with fused epiphyses was transformed to the length of their diaphysis (by subtracting 13 mm from the humerus with fused distal epiphysis or 6 mm from the radius or ulna with fused proximal epiphysis).

table by Stewart (OLIVIER 1960:259) for 46 children and juveniles are given on table 13:4.

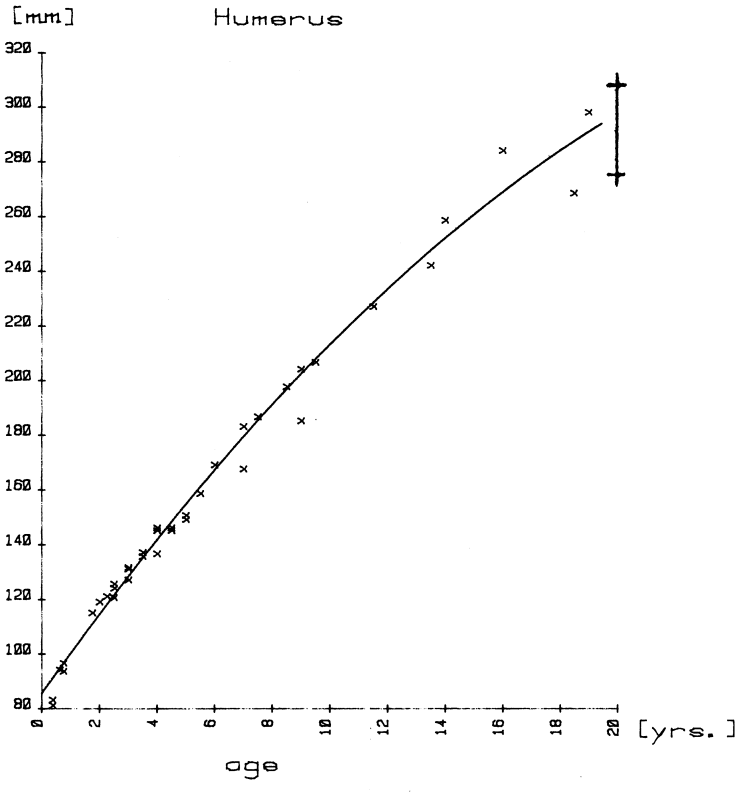
The table shows the regular growth of values in connection with age, which, in the overwhelming majority of cases, was determined according to the eruption of the teeth and the advance of the unification of the epiphyses and diaphyses. At the same time, side asymmetry can be observed on the long bones of the upper extremity already in childhood. The bones of the right side are longer than the bones of the left side. If we take into account only data of individuals with both pairs of bones preserved, the mean difference in favour of the right side amounts to 0.53 mm for the clavicle, 2.43 mm for the humerus, 1.75 mm for the radius and 2.31 mm for the ulna. This difference is not observed on the long bones of the lower extremity (femur longer on the left by 0.42 mm, tibia on the right by 0.04 mm, fibula on the right by 0.09 mm), nor on parts of the hip bones (height of ilium greater on the left by 0.56 mm, breadth of the ilium on the right by 0.30 mm, length of the ischium on the left by 0.22 mm, length of the pubis on the left by 0.45 mm).

On the basis of data in table 13:4 regression curves of the second degree[55] were constructed with the aid of a computer. They are presented on figs. 13:1—12. For the purpose of confrontation the mean values of the "diaphyseal" length of the bones of the extremities of adult males and females were added[56] to make it possible to assess the terminal of the curves, for which there were too few data in the section of juvenile age. A calculated regression equation was added to each curve.



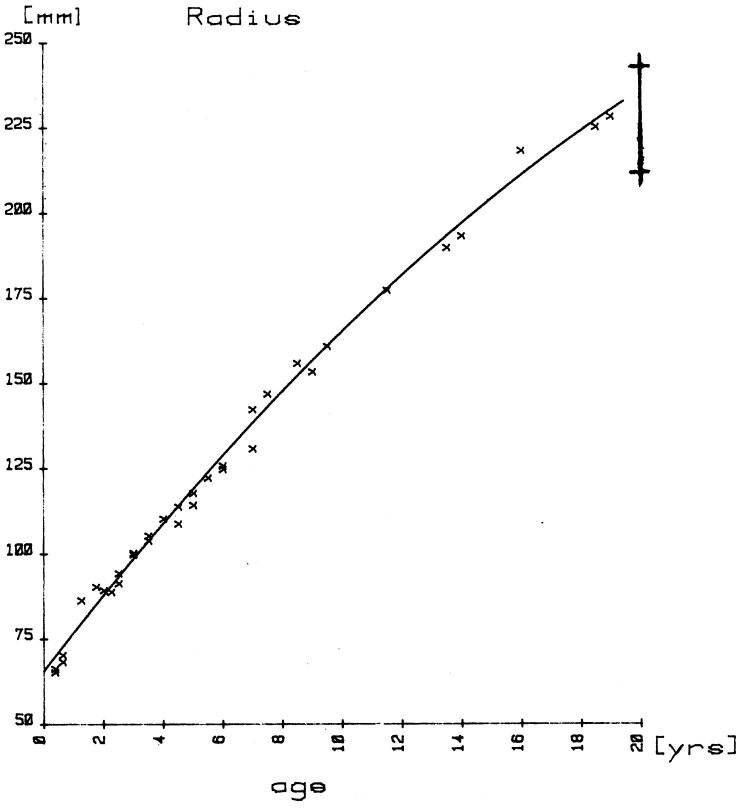
$y = 52.67 + 5.742\ x + (-0.0839)\ x^2$

Fig. 13:1 Growth of Diaphysis of the Clavicula adult females' mean



$y = 85.68 + 14.91\ x - 0.2157\ x^2$

Fig. 13:2 Growth of Diaphysis of the Humerus adult males' mean

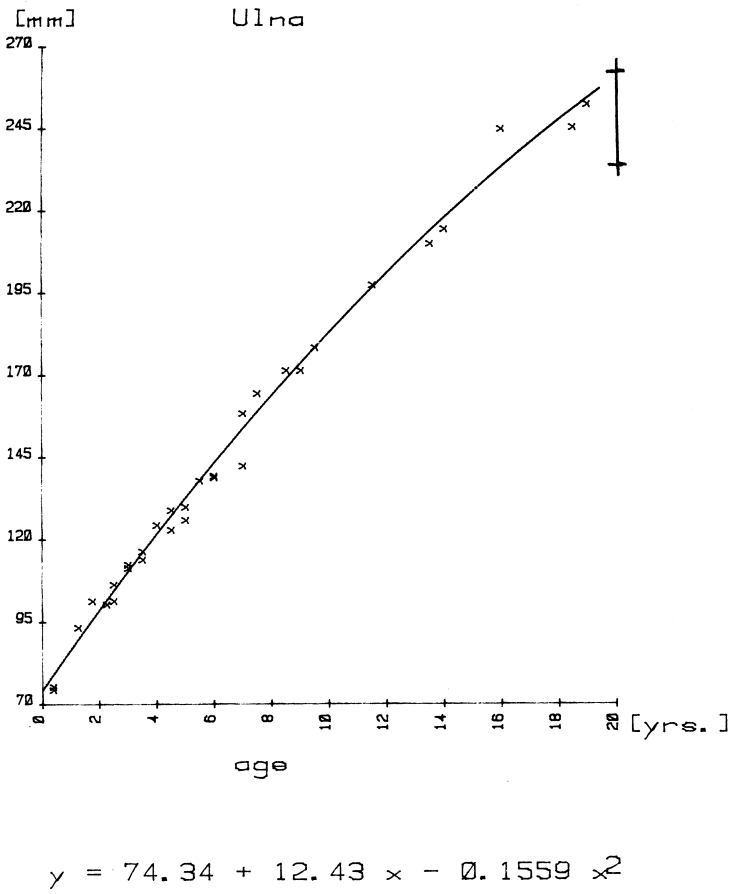


$y = 65.68 + 11.4\ x - 14.38\ x^2$

Fig. 13:3 Growth of Diaphysis of the Radius

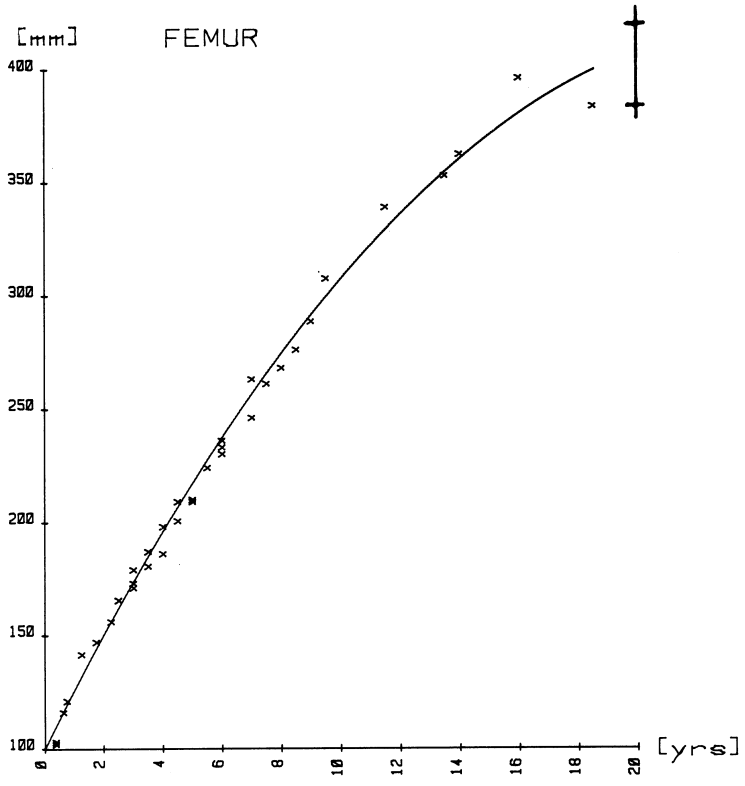
55 The average was taken in the case of data for both sides.

56 From the mean values of both sides of the greatest length of the relevant bone the following was subtracted: 6 mm in clavicle, 13 mm in humerus, 6 mm in radius, 6 mm in ulna, 22 mm in femur, 16 mm in tibia, and 12 mm in fibula.



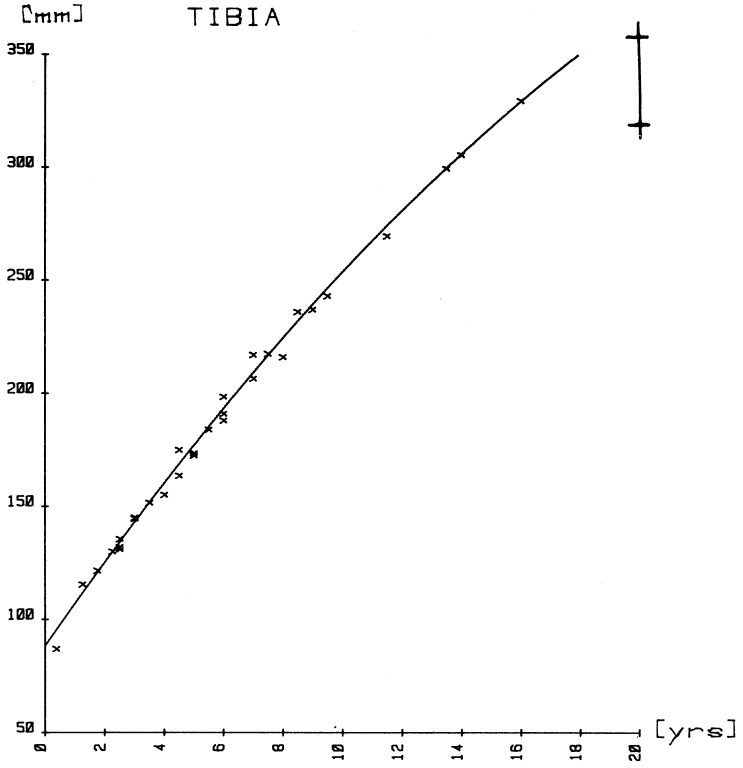
$y = 74.34 + 12.43\ x - 0.1559\ x^2$

Fig. 13:4 Growth of Diaphysis of the Ulna



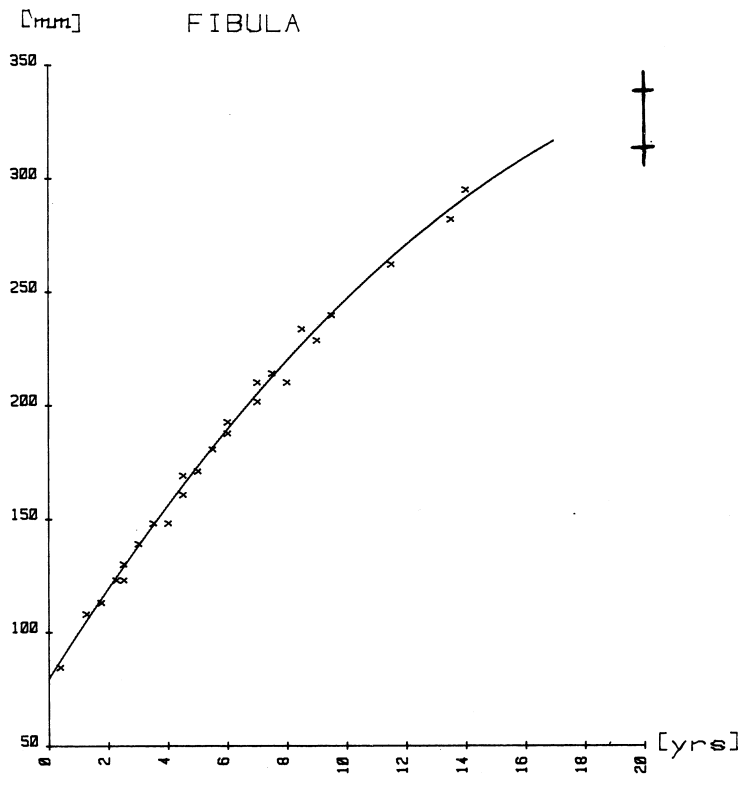
$y = -0.532*x^2 + 26*x + 100.1$

Fig. 13:5 Growth of Diaphysis of the Femur



$y = -0.244*x^2 + 18.96*x + 88.36$

Fig. 13:6 Growth of Diaphysis of the Tibia



$y = -0.395*x^2 + 20.66*x + 79.67$

Fig. 13:7 Growth of Diaphysis of the Fibula

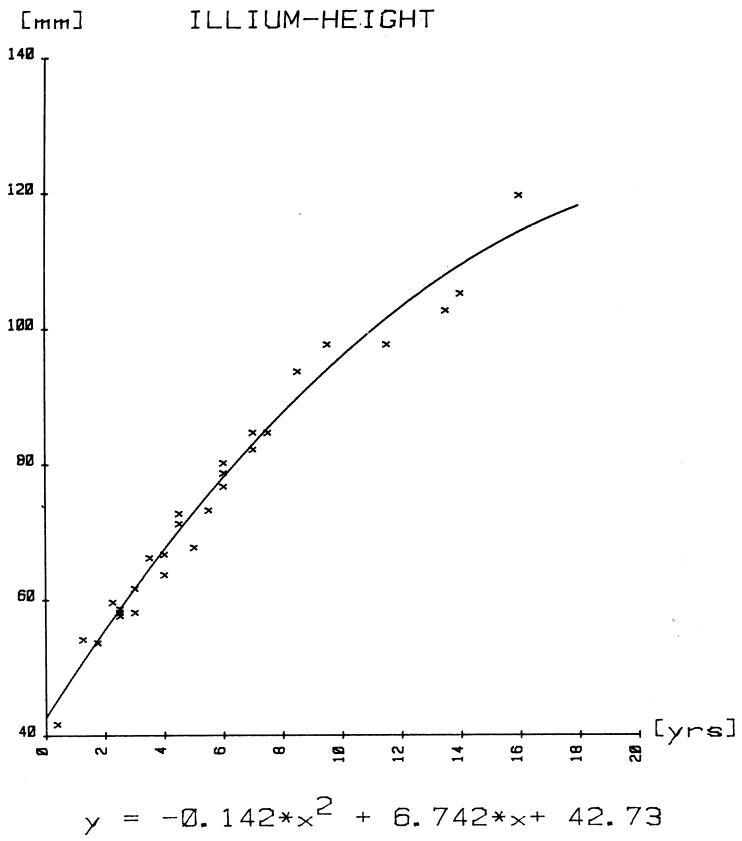


Fig. 13:8 Growth of the Ilium Height

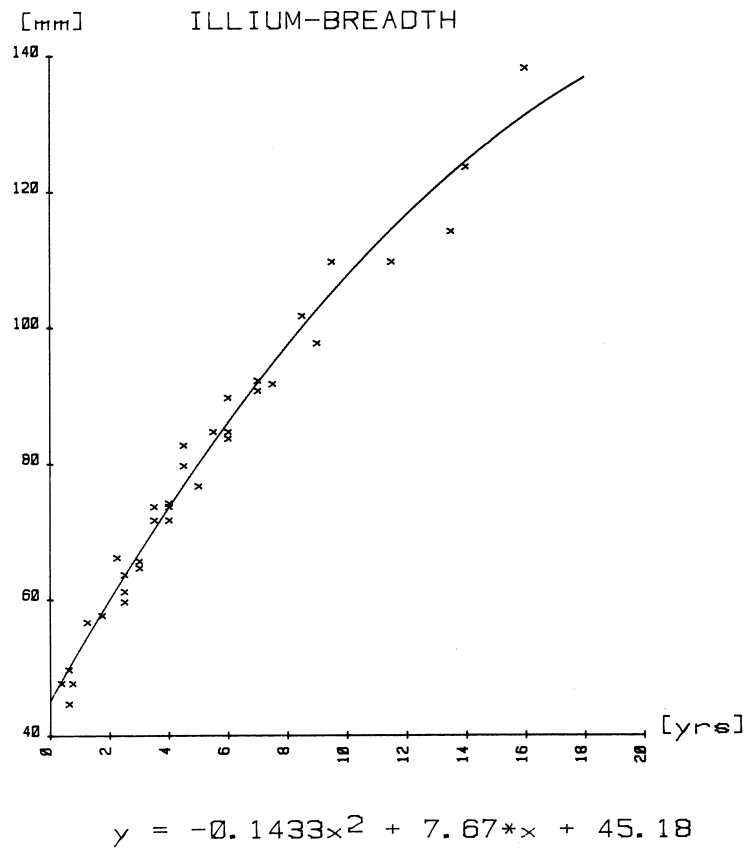


Fig. 13:9 Growth of the Ilium Breadth

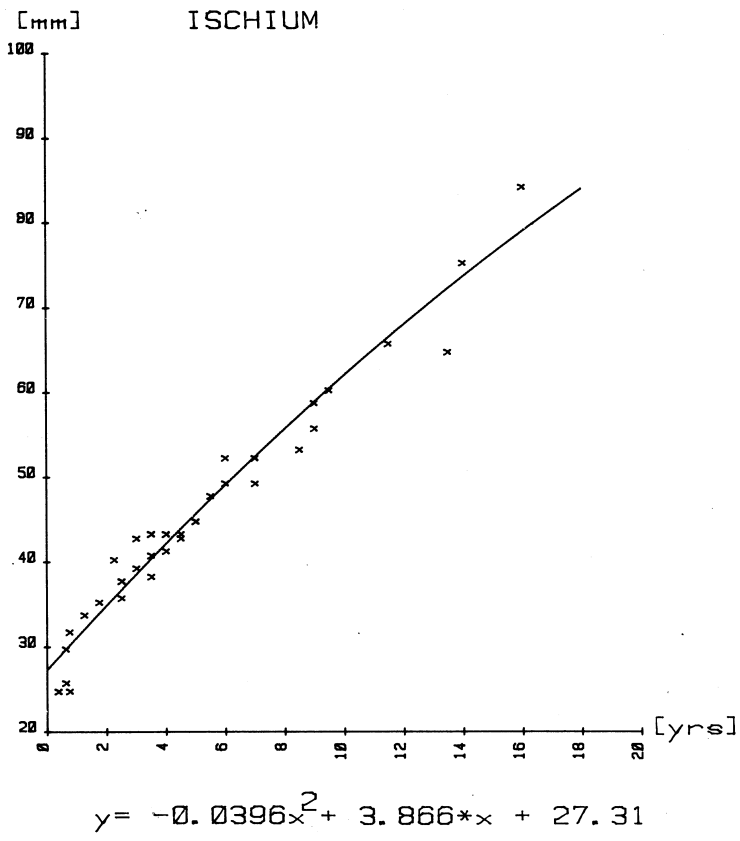


Fig. 13:10 Growth of the Ischium Length

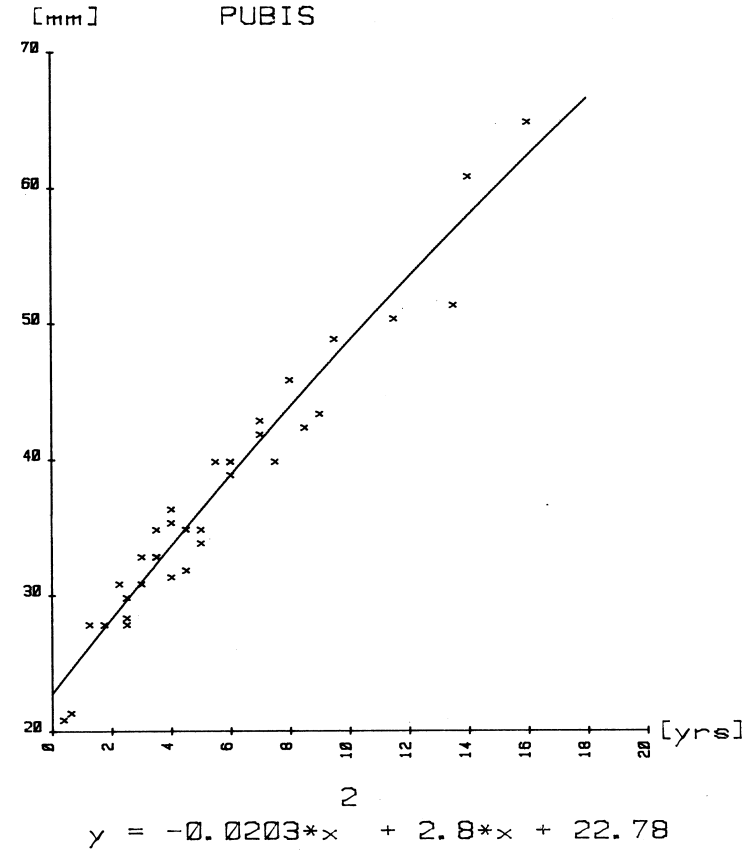


Fig. 13:11 Growth of the Pubis Length

All curves show at their start greater growth that gradually slows down. The bend of the curve is greatest for the ilium height (fig. 13:8), least for pubis length (fig. 13:11). The terminal of the curves for the length of the diaphyses of the extremities leads, in the majority of cases, to the zone between the male and female mean, only for the tibia does it reach slightly higher above the male mean (fig. 13:6).

Even if this can be regarded as a mere approximation of the rate of growth of the Abusir population in view of the small number of cases to set out the individual growth curves, we consider their construction a suitable working aid for the evaluation of the differences in growth of children and juveniles of various skeletal populations. Using the same method we worked out growth curves for the diaphyses of limb bones and parts of the hip bones of the 3rd to 5th century series from Wadi Qitna in Egyptian Nubia (STROUHAL, in press). The comparison of the individual curves shows mostly that the Abusir children grew quicklier than those in Nubia. Beause the Nubians reached higher stature in adulthood, we may infer that the growth of bones was prolonged in the Nubian children compared with those at Abusir. From this comparison it can be concluded that at Abusir the growth of children and juveniles was more favourable, which points, first of all, to the quantitatively and qualitatively more suitable food in the environment of the fertile Nile valley in Egypt.

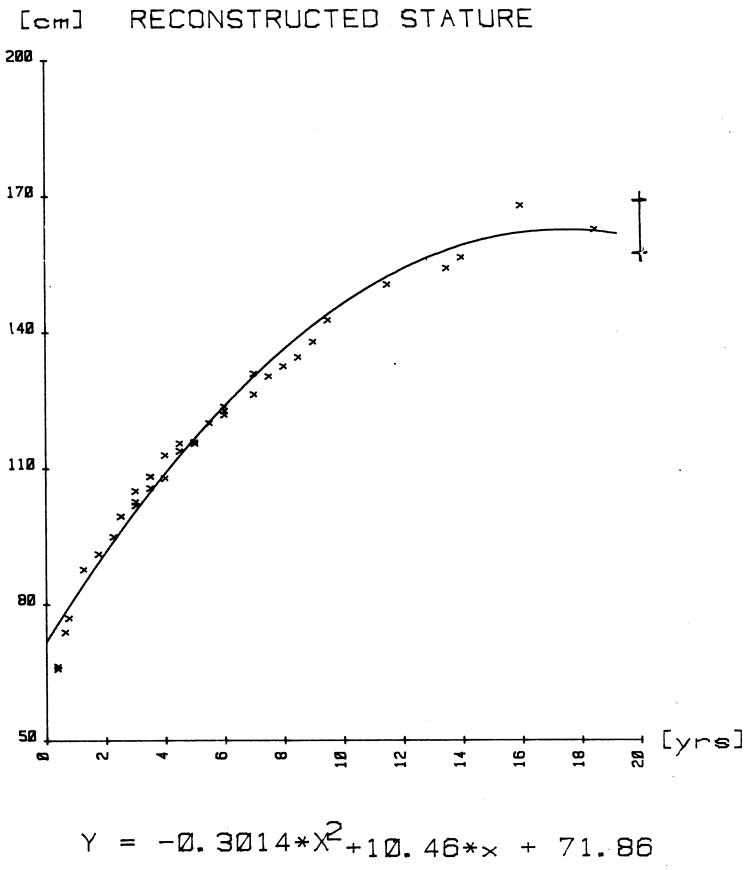


Fig. 13:12 Growth of the Reconstructed Stature

PALAEOPATHOLOGY

(With the radiological collaboration of L. VYHNÁNEK)

The pathological changes found are arranged in broader diagnostic categories — traumatism, inflammations, degenerative osteoarthropathies, tumours, osseous signs of anaemias, orthopedic disorders, congenital anomalies, diseases of unknown etiology, senile changes and pseudopathology[57]. Within the framework of these categories the individual cases are given in alphabetical and numerical order of the burials in both Abusir series together with their sex and age.

A) TRAUMATISM

a) Skulls

A 1 M 45—55 years
On the frontal scale just above the right linea temporalis and 34 mm forward from the sutura coronalis there is an oval depression (ant-post. 12 mm, transv. 10 mm, d. 3 mm) with a completely smooth surface. Conclusion (henceforth C): healed depressed fracture of the tabula externa most likely after a stab.

A 6 M 30—40 years (pl. 68:1)
On the frontal scale 40 mm forward from the sutura coronalis and 5 mm to the right of the mid-line there is an obliquely oriented oval depression (from the back med. to forward lat. 10 mm, from the back lat. to forward med. 5 mm, d. 3 mm) with rounded trabecular surface and a central pit (diameter 2 mm). C: healed depressed fracture of the tabula externa with traces of a stab.

A 10 M 25—30 years (pl. 68:2)
On the right parietal bone medially of the tuber parietale 26 mm forward from the sutura lambdoidea and 37 mm to the right of the sutura sagittalis, a depression begins which stretches obliquely forward and laterally (l. 54 mm). It has a prolonged triangular shape; it is broader at the back (b. 19 mm) ending in a point at the front, and the depth lessens in the same direction (at the back 3 mm, in front on the point 0 mm). The blow fell clearly from the back and top. C: Healed depressed fracture of the tabula externa caused by a cut.

A 12 M 40—50 years (pl. 68:3)
The left half of the nose skeleton was broken. The medial fracture line begins 2 mm laterally of the distal end of the internasal suture, the lateral fracture line begins above the maximum lateral concavity of the apertura piriformis. Both lines converge upward and merge in a contiguous point of the left sutura nasomaxillaris and the sutura frontomaxillaris. The position of the fragment that healed with a medial and a little distal shift shows that the blow (probably blunt) came from forward left and top. C: Healed fracture of the left edge of the apertura piriformis.

A 36/3 b M 40—50 years (pl. 68:4)
On the left parietal bone 10 mm to the left of the sutura sagittalis and 37 mm to the back of the sutura coronalis a narrow oval depression begins, reminiscent of a vulva, with the longitudinal axis in the sagittal direction (l. 29 mm, max. b. 12 mm, d. 3 mm). Its edges are slightly oval and smooth, the bottom is flat with two pits. The first of these on the frontal edge of the bottom is circular and smooth (diam. 2 mm, d. 1 mm), the second at the centre of the bottom circular, smooth, slightly funnel-shaped, darkly pigmented, with a fissure (diam. 4 mm, d. 2 mm). C: Healed depressed fracture of the tabula interna caused probably by a slash. The mentioned pits are probably the result of post-traumatic inflammation or the cutting weapon had two sharp points.

A 36/9 a F 35—45 years
On the right parietal bone 42 mm to the right of the sutura sagittalis and 10 mm forward from the sutura lambdoidea there begins a elongated depression running forward in a sagittal direction (l. 40 mm, max. b. 15 mm, d. 2 mm). It has smooth walls with a fluent transition to the surrounding, but in the frontal two thirds there is a 24 mm long line of a cut on the bottom.

On the same bone a further similar depression begins at the point on the sutura sagittalis 64 mm back of the bregma. It runs from the front medially to the back laterally (i.e. to the right) (l. 36 mm, max. b. 12 mm, d. 3 mm in the frontal third, lessering backward). The surface of the depression is smooth with a fluent transition to the surrounding.

On the left parietal bone runs a third depression from the same point on the sutura sagittalis 64 mm back of the bregma. It runs from the front medially to the back, slightly laterally (i.e. to the left) to a point 17 mm to the left of the sutura sagittalis and 31 mm forward from the sutura lambdoidea. This is a barely visible undemarcated groove

57 Diseases of dentition are included in chapter 15.

(l. 33 mm, b. 12 mm, d. 1 mm) with a smooth surface. C: Healed depressed fractures of the tabula externa caused by a series of three cuts, which were perhaps inflicted at the same time, probably from the top and back.

A 44/2 d M 30—40 years (pl. 68:5)
On the frontal scale along the mid-line 32 mm in front of the bregma lies an oblique oval depression (l. from the back left to the front right 17 mm, b. 8 mm, d. 2 mm). It has an undemarcated and smooth edge, the bottom, however, is scarred with uneven crests and pits. C: Healed depressed fracture, most probably after a stab.

I 324 F 40—50 years (pl. 68:6)
On the left tuber parietale, 57 mm backwards from the sutura coronalis and 52 mm laterally of the sutura sagittalis, there is a transversally oval depression (16 by 22 mm, d. 3 mm). It is undemarcated and quite smooth. C: Healed depressed fracture, most likely after a blunt blow.

I 383 F 30—40 years (pl. 68:7)
On the frontal scale 35 mm backwards of the upper edge of the left eye socket and 42 mm to the left of the medial line there is a circular shallow depression (diam. 12 mm, d. 1 mm). It is relatively sharply demarcated, the flat base is slightly scarred, in places with irregularities, in places smooth. C: Healed depressed fracture after a blunt blow or the result of cauterization with glowing wood or metal.

b) Infracranial Skeleton

A 7 — P 1 M adult (pl. 69:1, 70:1)
The diaphysis of the right ulna is thickened by a fusiform callus in the sector 40—73 mm from the distal end. It has a smooth surface except for a slight tubercle (diam. 4 mm, h. 2 mm) on the volar side. X-Ray and C: State after parry fracture of the distal third of the ulna healed in the dorsal and proximal dislocation of the distal fragment.

A 20 — L 1 M adult (pl. 69:2, 70:2)
The left radius has a bent distal sector from a point on the crista interossea 65 mm proximally of the end of the processus styloideus. From this point a rounded crest runs on the dorsal side to the processus styloideus. Between it and the crista interossea the surface of the bone is uneven with small trabeculae, pits and tiny perforations as a proof of ostitis suffered. On the dorsal side there is a crater-shaped depression (10 by 8 mm, d. 6 mm) with an uneven honeycomb-shaped bottom, most likely the consequence of osteomyelitis. The distal surface of the joint is twisted distally and ulnary and deformed in such a manner that the border between the radiocarpal surface and the incisura ulnaris has almost vanished. It can be traced as a slight edge but instead of transverse it runs in almost longitudinal direction. The articular surface is slightly polished and in places abraded, lined with irregular osteophytes. X-Ray and C: State after a fracture of the distal end of the radius with traces of post-traumatic ostitis and secondary degenerative arthritis.

A 23 — L 3 M adult (pl. 71:1, 72:1)
Only the lateral third of the left clavicle has survived ending medially with a broadened socket-shaped formation (circ. 70 mm). It is made up of finely trabecular bone with small apertures connected (as can be seen on its secondary fracture) with microcavities in the cancellous bone (osteomyelitis). The formation begins on the front edge of the bone 39 mm, on the back edge 60 mm from its lateral end so that it opens in a forward direction. X-Ray: Medial end of the fragment has strikingly irregularly demarcated dark shadow into which several transparent defects stretch. C: State after a fracture with subsequent pseudoarthrosis complicated by inflammation.

A 36/3 A F adult (pl. 69:3, 70:3)
The left radius was broken on a transverse line running 20—25 mm proximally from the distal end. The distal fragment is diverted to the volar side. No callus developed, the surface is smooth except for a band of new formation of bone running in the direction of the fracture line on the volar side. X-Ray and C: State after a Smith's fracture of the distal end of the radius.

A 36/4 — P 1 F adult (pl. 69:4, 70:4)
The right radius has an extremely curved diaphysis with a concavity directed ulnary. The right ulna is significantly S-shaped in both the frontal and sagittal planes. X-Ray: Arched bend of the right radius with an ulnary concavity without structural pathological changes and deformation of the shape and slant of the distal articular surface. Slightly bent distal third of the right ulna with an angle open dorsally. C: Axis change of both forearm bones, most likely, an adaptive consequence of a fracture suffered in childhood.

A 36/7 B M adult (pl. 69:6, 70:6)
Right ulna ends in a sharp bend of 90° in the volar direction. It broadens gradually to a secondary fracture line, 12 mm from the bend. This is the beginning of a bone bridge (synostosis), which continued to the radius, fixed in a medial position between pronation and supination. Unfortunately, the distal end of the right radius with the continuation of the bridge has not survived. The preserved part of the bridge is smooth except for an osteophytic margin (h. 1 mm), in the place of the transition of the bend to the bridge. On the distal side of the bridge the articular surface for the carpus is missing. Both bones are strikingly weakened ex inactivitate (min. circ. of the ulna 33 mm, radius 38 mm). X-Ray and C: State after an amputation at the level of the neck of the ulna, healed without traces of infection.

A 36/12 — P 2 M? adult (pl. 69:5, 70:5)
The distal section as much as 50 mm proximally from the distal end of the right radius has an uneven volar surface with rounded crests and a transverse oval shallow depression (15 by 10 mm, d. 2 mm). At a distance of 11 mm from the distal end there runs a transverse groove. The other sides of this sector are smooth. The fracture line cannot be seen and the change in axis of the given sector is hardly visible. X-Ray and C: State after a fracture of the distal end of the radius loco typico healed without dislocation.

A 43/2 — P 1 M adult (pl. 71:10, 72:9)
The tuberositas deltoidae of the right humerus is bulging considerably laterally in the form of a mighty crest with longitudinally running grooves and a rough surface. On the anterolateral side there is, 146 mm distally from the proximal end of the bone, an osteophytic process (10 by 8 mm, h. 2 mm), in which a fistula opens from the proximal

direction (diam. 1—2 mm). The crista tuberculi maioris turns distally into an anomalous crest with a rough surface, on which 100 mm distally from the proximal end of the bone a further fistula opens (diam. 1 mm), in the surroundings of which the bone surface is honeycomb-shaped (6 by 7 mm). The tuberculum minus is changed into a great cauliflower-shaped structure with a jagged surface (19 by 23 mm, h. 10 mm). A continuous osteophytic edge (b. 6 mm) is formed around the articular surface of the head. X-Ray: The middle third of the diaphysis is surrounded in the area of tuberositas deltoidea by a periostosis merging at the edge with the bone and bulging above the assumed prominence of the tuberositas. On the medial side the compacta of the diaphysis is interrupted by a cut that continues at a length of 75 mm as a fissure alongside its inner contour. It is accompanied by a parallel fissural transparence. C: Post-traumatic deformation of the diaphysis of the right humerus of an old date without changes in the axis of the bone, but with traces of osteomyelitis and arthritis of the shoulder joint.

A 44/2 M adult (pl. 71:4, 72:4)
The right metacarpal IV was broken in the diaphysis and fused without axis deviation with a minimum callus, whose surface is slightly roughened. X-Ray and C: State after a spiral fracture of the right metacarpal IV, healed in slight retraction.

A 46—1 M? adult (pl. 71:6)
The fifth finger of the left hand has the proximal and middle phalanges fused in volar flexion at an angle of c. 120°. C: Post-traumatic ankylosis of the distal interphalangeal joint of the fifth finger of the left hand.

A 46—4 F adult (pl. 71:7, 72:6)
The body of one of the lumbar vertebrae (L_4?) has the left anterior quarter of the compact plate squeezed by 5—6 mm with a lowering of the left anterolateral edge. The fractured surface runs from the centre of the frontal edge to the centre of the vertebral body and from there to the middle of the left lateral edge. Medially of the fracture, on the axis of the vertebra close to its anterior edge, a cavity of circular shape opens (diam. 7—10 mm) with irregular walls, pouches, trabecular prominences and tubercles. From the cavity tiny perforations go as far as the posterior wall of the vertebral body. X-Ray and C: Traumatic compression.

D 135 F 30—40 years (pl. 71:5, 72:5)
The left metacarpal IV was broken in the middle of the diaphysis. The distal fragment fused at an angle of 150° open volary. There is a minimum callus, and it has a lightly roughed surface with tiny prominences. X-Ray and C: State after a spiral fracture of the left metacarpal IV healed in light retraction.

D 334 M 30—40 years (pl. 69:7, 70:7)
The right ulna has a fusiform callus (circ. 53 mm) situated in the distal third 37—87 mm proximally from the distal end. The callus bulges mainly in the volar direction, less so ulnary and radially, dorsally being almost absent. The distal fragment fused almost without dislocation. X-Ray and C: State after a parry fracture of the distal third of the diaphysis of the right ulna healed without changes in the axis of the bone.

I 407/2 M 25—30 years (pl. 69:8, 70:8)
The right ulna has a fusiform callus (circ. 66 mm) on the border between the middle and distal third in a sector 65—117 mm proximally from the distal end, flattened in antero-posterior direction and extended in transversal direction (b. 23 mm). On the surface, which is mostly smooth, a groove (l. 40 mm) runs from the volar side obliquely radially upwards to the dorsal side. X-Ray and C: State after a healed parry fracture without dislocation.

I 444 M 28—32 years (pl. 71:9, 72:8)
On the border of the right ramus ossis ischii and the ramus inferior ossis pubis there is a relatively not very broad (b. 8 mm) and not voluminous (circ. 54 mm) callus above a transversally running healed fracture, whose fracture line is still visible at the back and lower surface. X-Ray and C: State after a healed fracture on the border between the os ischium and the pubis, without dislocation.

I 448 F 35—45 years (pl. 71:2, 72:2)
The right clavicle is shortened in its sternal third and irregularly thickened. In the sector 23—63 mm from the sternal end an irregular callus is formed (circ. 51 mm). Medially of it and forward from the impressio ligamenti costoclavicularis a large crater-shaped depression of oval outline opens in a forward and downward direction (antero-posteriorly 19 mm, transv. 9 mm, d. 6 mm). On its frontal edge it is divided by a narrow bone bridge, its walls are trabecular with small pouches. X-Ray: Morphological and structural deformation of the sternal third of the clavicle. Macroscopically described changes probably arose by resorption because signs of inflammatory changes are absent. C: State after a healed fracture of the sternal end of the clavicle.

I 452 M 40—50 years (pl. 69:9, 70:9)
The right ulna was broken twice, once in the lower third and once on the border between the lower and the middle third. Both fractures fused and were covered with a callus. The more distal of them is formed in a sector 45—76 mm from the distal end (circ. 51 mm). It has a smooth surface except for a button-shaped prominence with a sharp edge radially in front. The more proximal callus is formed in the sector 90—113 mm from the distal end (circ. 56 mm). It is smooth except for a sharp ridge running radially forward. X-Ray and C: State after a well-healed double parry fracture without dislocation.

I 452 M 40—50 years (pl. 71:11—12, 72:10)
The same individual as in the preceding case also had fractures of both right crural bones. On the distal end of the tibia a line of a spiral fracture has survived from the malleolus medialis to a point on the crista interossea 95 mm proximally of the distal end of the bone. The distal fragment has shifted slightly in a proximal direction, so that its proximal point protrudes above the crista interossea and the length of the bone was shortened by about 5 mm. The callus is nearly absent on the fibular side, it is formed more on the anterior side.

The same violence caused a fracture of the proximal end of the diaphysis of the right fibula. The fracture line is not visible since in the sector of the neck (25—70 mm from the proximal end of the bone) a callus is formed. It is not very voluminous (circ. 45 mm) and in the place of the crista interossea it runs into a tubercle (8 by 4 mm, h. 4 mm), on the

basis of which an oval aperture opens distally (4 by 3 mm). On the lateral side another tubercle rises with an irregular trabecular surface (7 by 7 mm, h. 3 mm), from the proximal edge of which there is likewise an oval aperture (3 by 2 mm). These are clearly fistulae during osteomyelitis. X-Ray and C: State after a non-dislocated fracture of the head of the fibula with inflammatory complications and a spiral fracture of the distal part of the diaphysis of the tibia with minimum retraction.

I 466 M 25—30 years (pl. 69:10, 70:10)
The left ulna has a voluminous fusiform callus (circ. 48 mm) in the sector 35—65 mm proximally from the distal end. Its surface is smooth, only a little uneven on the radial side. The distal fragment is slightly dislocated from the axis with an angle opening dorsally and a bone that is slightly shortened. X-Ray and C: State after a parry fracture with a massive callus, which spanned the area of the angular (160°) dislocation of the distal fragment.

J 1483 M 40—50 years (pl. 71:8, 72:7)
Vertebra L_1 has the left half of the upper compact plate squeezed inside the vertebral body. The vertebra is wedge-shaped when seen from the left side (antero-lateral h. on the left 17 mm, on the right 22 mm). X-Ray and C: Traumatic compression of L_1.

J 1960 F 50—60 years (pl. 69:11, 70:11)
The right radius was broken in the distal sector on a line running from a point 38 mm proximally from the distal end on the linea interossea to a point 24 mm proximally from the distal end on the outer edge of the radius. A callus formed in the shape of a low rounded ridge (l. 19 mm, b. 4 mm, h. 2 mm) only on the volar side. The distal fragment fused in an axial deviation with an angle of 160° opening dorsally and 150° opening radially. X-Ray and C: State after a Colles' fracture healed in typical dislocation.

J 1973 M 35—45 years (pl. 71:3, 72:3)
The left clavicle has signs of a fracture running lengthwise slightly obliquely in the medium third of the diaphysis. The fracture line can be recognized from a point 48 mm laterally of the sternal end on the lower dorsal edge of the bone, from where it runs almost horizontally in a lateral direction to a point 37 mm from the lateral edge of the frontal edge of the bone (1. of the fracture line cca 52 mm). The lateral fragment shifted slightly along the fracture line medially (by c. 5 mm) and a steplike depression was formed (h. 7 mm) at the same time on the anterior and lower edge of the bone in the place of the medial end of the lateral fragment. X-Ray and C: State after a healed oblique fracture of the middle third of the diaphysis of the left clavicle.

c) General Evalution

In the joint series from Abusir there occurred a total of 31 traumatic lesions among a minimum number of 159 juveniles and adult individuals (19. 5%). This points to a medium frequent occurrence of traumatism. For comparison it can be said that at the Late Roman — Early Byzantine cemetery at Sayala (Egyptian Nubia) 179 lesions were found among 394 individuals (45. 4%) (STROUHAL and JUNGWIRTH 1980, 1982).

30 individuals (18. 9%) were affected by 31 lesions in the joint Abusir series. In one of these, I 452, a man aged 40 to 50, two separate lesions were found. Multiple lesions that originated probably by the same mechanism and at the same time (double fracture of the ulna in a 40—50 year old male I 452 and three cutting blows on the parietal bone in a 35—45 year old female A 36/9 a) were regarded as one unit of lesions.

As to sexual differences, the lesions occurred almost twice as often in males (21, 23. 9% of the total number of males) than in females (9, 12.7%). Among males there were 22 (71%), but among females only 9 (29%) of the total number of lesions. This find corresponds to the great exposure of males to external violence in view of their working activity mainly outside the home and their differing, more aggressive behaviour.

As to age, no lesions were found in children and juveniles, as well as in adults under the age of 25. They occurred most often in older rather than younger persons of adult age.

As to laterality, lesions situated on the right prevailed (16, 51. 6%) over lesions on the left (11, 35. 5%) and lesions in the mid-line or symmetrically on both sides (4, 12. 9%). This fact (as well as the character of most injuries and their relatively limited number) speaks against the origin of the majority of lesions in fights, in which — in view of the prevailing right-handedness of the opponent — most often the left side is affected (e. g. in Sayala, STROUHAL and JUNGWIRTH 1980, 1982).

Of the total number of 31 traumatic lesions 9 (29%) were located on the skull, 2 (6. 5%) on the spine and 20 (64. 5%) on the rest of the infracranial skeleton. A survey of these is given in table 14:1.

Of the individual regions of the skull, the frontal and the parietal were affected equally (each 4, 12. 9%), less the nasal region (1, 3. 2%). The left side is represented a little more frequently (4 cases) than the right (3), the mid-line (1) and both sides (1). In the frontal region stabs, in the parietal cuts prevailed, injuries caused by a blunt blow were found in each of the skull regions mentioned only once. In one of these cases (30—40 year old female I 324) the character of the lesion would admit origin by artificial medical treatment, cauterization. This was common in the cemetery at Sayala (STROUHAL 1981), and its use in ancient Egypt was known (FIELD 1954). In some cases of skull injuries one can admit even the possibility of origin in fighting. In view of the small number of occurrences these may have been isolated skirmishes between hostile persons rather than battles on a larger scale.

The predominantly peaceful origin of traumatic lesions is confirmed by the fact that on the infracranial skeleton no lesions at all were found to have been caused by direct effect of external force (stabbing, cutting, blunt blows) except for the case of amputation of the antebrachial bones. They were exclusively fractures and post-traumatic changes. The bones most often affected, however, were those of the forearm (ulna 16. 1%, radius 12.%, both bones 6. 5%; together 35. 5% of the total number of lesions).

All fractures of the ulna were of the parry fracture type with localization in the distal third of the bone. They

affected exclusively males. Strangely enough, the right side prevailed over the left at a ratio of 4:1, which does not correspond to the usual knowledge of protection of the face by raising the left arm. Either among the defending males there were more left-handed ones or this is a random find in a small number of cases. Also these fractures can be regarded as injuries arising in fights between individuals.

The fractures of the radius were always situated at the distal end. The Colles' and the Smith's types as well as the loco typico and the type with anomalous deviation of the distal fragment ulnary occurred each in one case. Both sexes were afflicted in equal share.

Traumatic changes of both bones of the forearm included a case of post-traumatic deformation of the shape and an unique case of an artificial intervention — amputation close above the distal end of the forearm of adult male A 36/7 B — P 1 + 2. Only two other cases of amputation from ancient Egypt have so far been described in literature. In the series of the IXth dynasty from Sedment about 10 cm of both right forearm bones of an adult male were found to be cut off. The ends of the stumps of both bones were also linked with a rounded bridge. On both diaphyses inflammatory pitting remained visible (BROTHWELL and MØLLER–CHRISTENSEN 1963). The second case is a mummy of an older male from the Ptolemaic Period (330—30 B. C.), who lost his hand and the distal end of the right forearm bones "several inches above the wrist", according to the author probably in his youth and in a fight. The embalmers added an artificial hand with fingers (GRAY 1966, 1967). In comparison with these cases the line of amputation in our case lay lower, just above the radio-ulno-carpal joint and the action did not lead to inflammatory complications, but healed smoothly. Identically as in the two analogies quoted an adult male underwent amputation and this affected the right forearm. From ancient Egyptian texts and scenes depicted on the walls of temples and tombs of the XIX dynasty and later we know that amputation was carried out both on living and on dead persons. In the living this might have been cutting off of the arm in battle, a surgical intervention for an accident or infection, or punishment for stealing. Furthermore, dead enemies had their hands or sex organ cut off for the purpose of evidence of their number. This was, obviously not the case of any of the three amputations mentioned.

Among the other infracranial regions most often clavicles were affected by fractures (9. 7%), there was one case each, of the acromial, medium and sternal third, further metacarpals (6. 5%) and the spine (6. 6%). The other locations (fractures of the humerus, hip bone between the ischium and the pubis, tibia with fibula and post-traumatic changes of the joint between the middle and last phalanges) occurred in single cases only.

B) INFLAMMATIONS

Inflammatory complications were mentioned in describing 5 of the above 31 traumatic changes (16. 1% of their total number). This is a proof of the good resistance of the people of the time, and probably of the rare occurrence of open, infected fractures. Apart from these changes a further 5 cases were found with an other etiology than merely traumatic.

D 230 a M 30—40 years (pl. 73:1—2)
The diaphysis of the right femur has the back medial side below the trochanter minor as far as 147 mm distally from the proximal end swollen and ending at the point mentioned in a step-like manner (h. 2 mm). The surface of the bone is slightly uneven with small tubercles and grooves. X-Ray: In the proximal third of the diaphysis thickening and striation is evident, particularly on the medial side, and a spotted structure of the medullar cavity. C: Osteomyelitis chronica of the right femur.

I 337 M 20—21 years (pl. 73:8)
The right femur has an antero-posteriorly oval defect (17 by 8 mm, d. 8 mm) on the lateral edge of the base of the tibial condyle with smooth slightly thickened edge. The base of the defect is even, slightly granulated, perforated with a number of smaller and larger apertures (fistulae). C: Osteochondritis dissecans of the right femur.

I 456 F 25—30 years (pl. 73:3—4)
The left tibia is thicker than the right along the entire length. The proximal third has a folded, in places bulging but smoot surface. On the medial side 75 mm distally from the medial condyle, roughly in the middle between the margo anterior and the margo interosseus, there is a clear-cut oval aperture (proximo-distally 8 mm, antero-posteriorly 5 mm), towards which the surrounding slopes in funnel shape. This is a fistula that penetrated deep into the medullar cavity. X-Ray: The proximal third of the diaphysis has a compacta with blurred contours on the inner side, and along the whole length an irregularly spotted structure of the medullar cavity. In its shadow there stands out a circular transparence (diam. 3 mm) corresponding to the macroscopically ascertained fistula. The shadow of the bone is of high density only on one side of the transparence. C: Osteomyelitis chronica of the left tibia.

I 460 F 23—27 years (pl. 73:7)
On the left parietal bone there is a transverse oval area (transversally 38 mm, sagittally 14 mm) of uneven surface and black pigmentation behind and medially of the tuber parietale (23 mm laterally of the sutura sagittalis, 19 mm forward of the sutura lambdoidea), with a slight transversal depression. C: Ostitis caused either by an inflammatory disease of the soft tissue or as a complication of a trauma.

I 466 M 25—30 years (pl. 73:5 — the distal third is missing on the photo, pl. 73:6)
The left fibula has an irregular thickened surface in two sectors. In the proximal third 74—110 mm from the proximal end (reconstructed according to the right fibula of the same individual) there is a thickening folded proximo-distally by ridges and grooves and on the dorsal side a tubercle (8 by 4 mm, h. 2 mm) with a pit (diam. 3 mm, d. 2 mm) on the distal edge of the tubercle. In the distal third 84 to 117 mm from the distal end there is a similar thickening, laterally smooth, medially divid by two proximo-distally running grooves. X-Ray: Circular periostoses are visible in the proximal and distal thirds, some of which are not completely merged with the bone (preserved fissures). The inner structure of the bone is not significantly affected. C:

Periostosis as a reactive bone change to a diasease of the surrounding soft tissues.

In summing up it can be stated that the freqency of inflamatory changes was even smaller than in the case of traumatism (10, 6.3% of the total number of juvenile and adult individuals). It occurred more often in males (80% of lesions in 9. 1% of the total number of males) than females (20% of lesions in 2. 8% of the total number of females). They were not found in children and juveniles, but in adults beginning at the age of 20. With the exception of inflammations complicating traumata, inflammations tended to affect younger adult individuals. Inflammatory changes were a little more often on the left (60%) than the right (40%) side. As to anatomical location, inflammations affected the parietal region of the skull (2), clavicle (1), humerus (1), radius (1), femur (2), tibia (1), and fibula (2). In 5 cases the etiology was traumatic (see tab. 14:1), in one of the further cases (I 460) the traumatic origin cannot be excluded. In two cases it was most likely a reactive bone change to a disease of the neighbouring soft tisue. The origin of osteochondritis dissecans is not known so far, and in both cases of chronic osteomyelitis it was not possible to ascertain the cause.

C) DEGENERATIVE OSTEOARTHROPATHIES

This category comprises changes of a similar pathologico-anatomical ground, but they differ significantly in appearance and location. On the spine it is osteophytosis of the vertebral bodies, degenerative arthritis of the intervertebral joins and signs of osteochondrosis of the intervertebral discs on the cranial and caudal surfaces of the vertebral bodies. A separate group is formed by degenerative arthritis of the extra-spinal joints and extra-spinal osteophytosis in various locations. We shall deal with the osteoarthropathies in this order.

a) Spinal Osteophytosis (examples on pl. 74:1—4)

On each vertebral body the degree of osteophytes was evalued according to a simple scale: 0 — no osteophytes, 1 — osteophytes shorter than 3 mm, 2 — osteophytes longer than 3 mm, 3 — extensive bridging osteophytes, usually not fused (according to STLOUKAL, VYHNÁNEK and RÖSSING 1970).

The results gained from individual burials (second series from around the Mastaba and four D burials inside the Mastaba) consisting of adult individuals with surviving entire or partial spine are dealt with in table 14:2. The average age of the series of evalued males was 33.3 years, of the series of females 34.1 years. For illustration the average degree of osteophytosis of each vertebra was given graphically separately for males and females on fig. 14:1.

The table and the figure reveal that four peaks are formed whose height increases in a cranio-caudal direction. The first is on the epistropheus (C_2), the second on the lower cervical spine (C_{5-6}), the third on the begining of the lower thoracic spine (Th_{7-8}) and the last on the lower lumbar spine (L_{4-5}). By contrast, minima of roughly the same low intensity (with the exception of the third minimum in males) are apparent on C_3, Th_1, and Th_{12} — L_1. At the same time the course of the curve reveals that osteophytosis affected males with greater intensity than females (with the exception of sectors C_7 and Th_{4-6}).

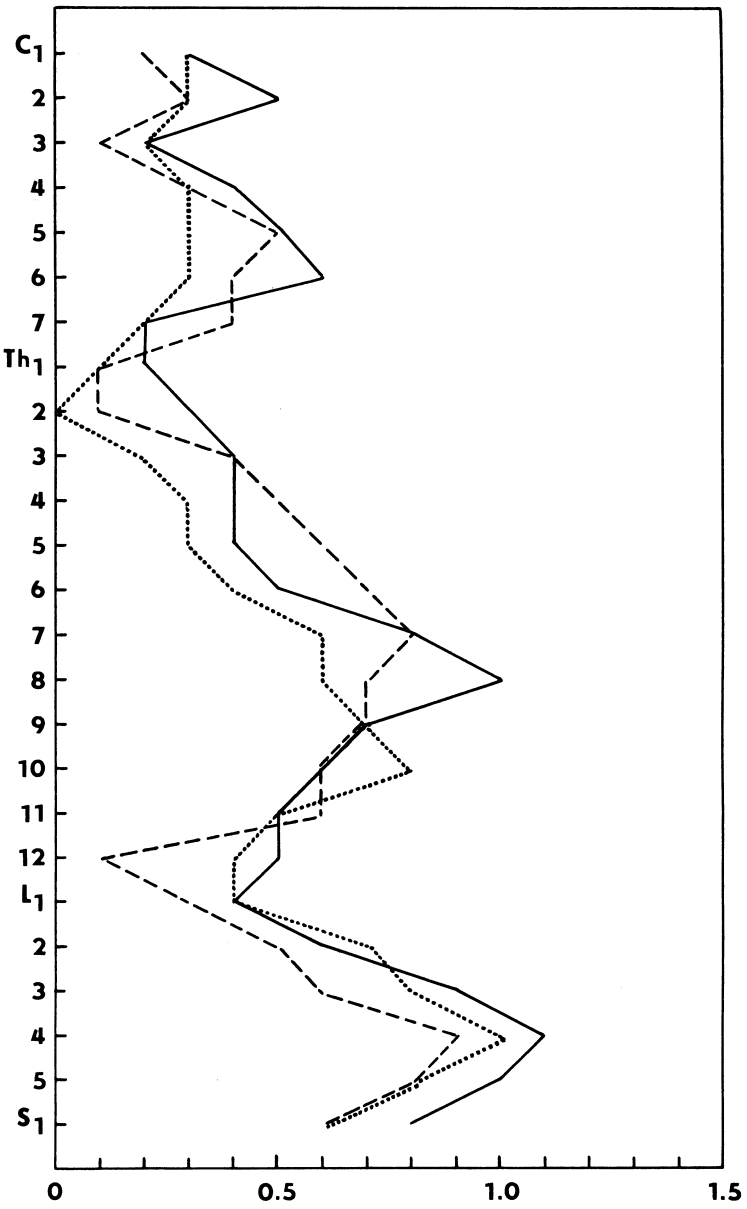


Fig. 14:1 Mean Degree of Spinal Ostephytosis in Adults

——— males (n = 26—31) of the second series (including burials D)

– – – – females (n = 22—28) of the second series (including burials D)

..... both sexes (n = 16—36) of the first series (except burials D)

In the comparative series from the above quoted cemetery at Sayala (STROUHAL and JUNGWIRTH 1980) both servical peaks merge, the thoracic is shifted slightly lower and the lumbar is located identically. As to intensity of changes, the maximum on the lower thoracic spine is similar in Sayala and Abusir, by contrast, the maximum in the lower cervical and lower lumbar spine is generally more significant in the series from Sayala. In view of the fact that osteophytosis is considered a typical symptom of wearing out of vertebral bodies, it can be assumed that both populations exerted the spine physically, but at Sayala far more than at Abusir.

The development of osteophytosis shows close connection with individual age (tab. 14:3). It does not occur at all in children and juveniles. In the age group 20—30 years first changes (lst degree) appear between 22. 5 and 25 years, greater changes (2nd degree) occur only in isolated cases, all in individuals over the age of 27. 5 years, and the severe changes (3rd degree) not at all. In the age group 30—39 years affliction of the 1st and 2nd degree increased and on rare occasions the 3rd degree was found. In the highest age category one can observe a striking decrease of non-affected vertebrae at the expense of the growth in the frequency of all degrees in males and of the 2nd degree in females, among whom the 3rd degree remained always exceptional.

As an example of an advanced type of osteophytosis we can present a 40—50 year old male I 449 (pl. 75:1). On the right anterolateral side of the vertebral bodies Th_{5-12} mighty bobbin-shaped layers of new bone are formed, which link into one an other by the wavy edges without fusion. On the lumbar spine (pl. 75:2) there are only the usual osteophytes of the 2nd degree, only L_4 on both sides cranially and L_5 on the right cranially and caudially show the same formations as in the thoracic sector. The intervertebral joints are not arthritic and no fusion took place in the sacroiliacal joints.

On the right anterolateral side of the vertebral bodies Th_{8-12} of a 40—50 year old male I 452 (pl. 75:3—4) can be seen similar bobbin-shaped formations, touching at the edges but not fused. On L_{2-4} mighty formations of the same type developed on the anterolateral side, on the right less, more strikingly on the left. Even here the intervertebral and sacroiliacal joints are without changes. This case might be a type of bridging osteophytosis with S-shaped kyphoscoliosis, which, however, is of a relatively small degree. An example of a similar type of osteophytosis with significant scoliosis is given in the section devoted to orthopaedic diseases (F; pl. 75:7).

For interest's sake spondylotic changes were also scored on scattered vertebrae from the area inside the Mastaba (first series without D burials). In view of their relatively small number and unreliability of sexual diagnosis they were not divided into male and female series but were dealt with together (tab. 14:2, dotted line of fig. 14:1). The results in the region of the cervical and upper thoracic spine show lower intensity of affliction than in the rest of the material, divided into male and female series, and the two lower peaks in the region of the cervical spine are absent. By contrast, the result in the region of the lower thoracic and lumbar spine are basically identical as in both sexed series with the exception of the shift of the thoracic maximum to Th_{10} (instead Th_{7-8}). Deviations in the upper half of the spine might have been caused by greater presence of vertebrae of younger individuals.

b) Degenerative Spondylarthritis

The affliction of the spinal joints was observed in a relatively small number of individuals with a predominance of females over males. In the series around the Mastaba and in individual D burials inside the Mastaba 2 cases of adult males were ascertained (6. 1%) among 33 surviving spines, in adult females 6 cases (20%) out of 30 spines. In males it was a 35—45 year old individual I 395 with the affected joints C_{2-3} on the left, Th_{3-4} on the right and L_{1-2} on the right. In a 20—21 year old male I 337 initial changes were found on both sides on Th_{11-12}. In females spondylarthritis was present in three individuals of the age 30—40 years (I 287: $C_{2/3}$ and $C_{3/4}$ on both sides, $C_{4/5}$ and Th_{2-3} on the right; I 447: $Th_{8/9}$ on both sides; D 135, pl. 74:7: $L_{4/5}$ on both sides), in a 35—45 year old female I 448: $Th_{7/8}$ on both sides), in a 40—50 year old female I 401 ($C_{2/3}$ on the right, $C_{4/5}$ on the right) and in a 50—60 year old female J 1960 (C_1 to C_7 on both sides, pl. 74:5). It is interesting that where the occurrence was asymmetrical it affected exclusively the right side.

In the 50—60 year old female J 1960 mentioned (pl. 81:5—8) there is complete fusion between the atlas and the left occipital condyle of the skull (the right is not preserved) as well as between C_2 and C_3 in the bodies and the right intervertebral joint (the left is not preserved). In view of the advanced osteophytosis and degenerative spondylarthritis in the region of the cervical spine of this individual these seem to be secondary blocks.

c) Osteochondrosis

Osteochondrosis of the intervertebral disc, which shows in the from of abrasion or erosion of the upper and lower compact plate of the vertebral body, appeared likewise in a small number of individuals with a predominance of females over males. It was systematically scanned in the series around the Mastaba including individual D burials inside the Mastaba. In adult males there occurred two cases (6. 1%), in adult females 5 cases (16. 7%). In 25—30 year old male J 1965 initial changes were ascertained in the frontal third of the compact plates of bodies $C_{3/4}$, in 35—45 year old male I 395 (pl. 74:6) developed changes on the adjacent plates of bodies C_3 to C_6. In 30—35 year old female J 1961 there was likewise initial affliction of the frontal third of the adjacent compact plates of bodies C_{5-6}, in 30—50 year old female I 406 developed changes on $C_{5/6}$, in 40—50 year old female I 401 in the range of C_5 to Th_1, in an equally old female J 1971 atypically on L_5/S_1 and in a 50—60 year old female J 1960 on $C_{6/7}$. It is typical that these were almost exclusively afflictions of the cervical sector of the spine (with the exception of J 1971).

d) Degenerative Arthritis

Of the joints other than the spine signs of degenerative arthritis were found most often on the temporomandibular joint. They did not occur in children and juveniles. Of the total number of 122 evalued adults, initial or developed one or both-sided temporomandibular arthritis occurred in 21 individuals (17. 2%), of these in 11 of the 57 females (19. 3%) and 10 of the 65 males (15. 4%).

As examples we present the right condyle deformed on the anterior and upper side by a depression with a fine honeycomb-shaped structure in a 35—45 old female A 36/9 a (pl. 76:1), a similar depression ending in an uneven edge

on the upper plane of both condyles in a 28—32 year old male D 130 a (pl. 76:2), and, finally, a depression (12 by 6 mm, d. 3 mm) in the same place with a slightly rugged edge and a cruder honeycomb-shaped structure in a 40—50 year old female J 1744 (pl. 76:3). The most progressive changes were found in a 25—30 year old male A 46 d. The left processus condylaris of the mandible was resorbed and on the level of the incisura mandibulae a low oval plane is formed slightly bulging upward and irregularly oval if viewed from above (l. from front laterally to back medially 23 mm, b. perpendicularly to it 21 mm). It is irregularly rugged with a number of smaller and one larger crater-shaped depressions. The facies glenoidalis of the left temporal bone (pl. 76:4) has its original surface unchanged only on the back edge, while forward and laterally it is broadened to an irregularly rugged formation, laterally jagged by deep crypts and trabeculae (l. from front laterally to back medially 27 mm, b. perpendicularly to it 23 mm). It has a concave shape (d. 7 mm), into which the above described formation replacing the left condyle of the mandible fits exactly. The pathologically entirely changed joint permitted limited movement, but this must have been painful. According to the normal state of the facies glenoidalis on the right (the condyle did not survive), it was a one-sided process. It is interesting to note that it was not possible to find a clear connection between the development of arthritic changes of the temporomandibular joint and pathological changes on the dentition. In some cases with arthritis faultless dentition was found.

Degenerative arthritis of the large joints of the extremities appeared more rarely. It was not observed in children and juveniles. Of the total minimum number of 159 adults it was found in 12 individuals (7. 5%) of these 9 males (10. 2%) and 3 females (4. 2%). The greater affliction of males was most likely related to their greater physical activity and exposure to wear-and-tear influences. Of the individual joints of the upper extremity degenerative arthritis was found twice in the right shoulder joint (adult male A 43/2 — P 1, 40—50 year old male I 449, pl. 76:6), once in both radiocarpal joints (50—60 year old female J 1960, pl. 76:5) and once in the left radiocarpal join (adult male A 20 — L 1). Of the joints of the lower extremity degenerative arthritis occurred once in the right hip-joint (30—50 year old male I 454, pl. 77:1), twice in both knee joints (30—50 year old female J 1889, pl. 77:2, showing eburnisation of the articular surface of both patellae with significant abrasive grooves; 50—60 year old female J 1960, pl. 77:3 with productive changes in the form of chondromatous corpuscles) once in the left talocrural joint (adult male A 43/4 — L 1) and four times in the talocalcaneal joint (on the right, 40—50 year old male I 449, pl. 77:4; on the left, adult male A 43/4 — L 1, pl. 77:5; on the left, adult male A 44/1 — L 1, pl. 77:6; on the right, adult male A 46 — P 1, pl. 77:7). In all cases the articular surfaces of the talus and calcaneus were broadened by a new-formed bone lamellae with irregularly tipped osteophytic edges and a rugged, in places honeycomb-shaped surface. Two of the cases mentioned (A 43/2 — P 1, A 20 — L 1) were post-traumatic consequences, while in the rest arthritis seems to have arisen independently as an degenerative process.

In no case was arthritis of the rheumatoid origin ascertainned affecting several joints in one and the same individual. The intensity of arthritic changes found never reached the degree of extensive changes usual in infectious arthritis.

e) Extraspinal Osteophytosis

This heading comprises the occurrence of exostoses in various locations except vertebral bodies. They were not observed in children and juveniles. Of the overall minimum number of 159 adults they were found in 7 individuals (4. 4%), of this in 6 males (6. 8%) and 1 female (1. 4%). This includes a special case of enthesopathy, the result of the ossification of the ligamentum supraspinale between Th_4 and Th_6 in an adult male A 6 (pl. 78:1), further exostoses on both tuberositates radii of a 30—40 year old female D 135 (pl. 78:3), on both tubera ischiadica of a 40—50 year old male I 449 (pl. 78:2), on both medial planes of the fibulae and the lateral planes of the tibiae in the distal quarter of the diaphyses of a 35—45 year old male J 1973 (pl. 78:6), on the right medial plane of both fibulae from the facies articularis malleoli to a point 38 mm distally from the distal end of an adult male A 43/3 — L 1 and P 1 (pl. 78:4), in the same place on a smaller scale and on the proximal quarter of the margo anterior and posterior and mainly on the crista medialis of both fibulae of an adult male A 32/2—1 and on the proximal quarter of the margo medialis and lateralis of the left fibula of a 28—32 year old male I 393 (pl. 78:5).

D) TUMOURS

In the whole material only one case of a benign bone tumour—osteoma—was found in a 30—40 year old male A 36/4 a (pl. 78:7). It was of solid consistency, in the shape of a segment of a sphere (ø 16 mm, h. 4 mm) and located on the occipital scale, 5 mm to the right of the mid-line and 20 mm backwards from the sutura lambdoidea.

E) OSSEOUS SIGNS OF ANAEMIAS

Into this category usually cribra orbitalia are classified the occurrence of which is shown in table 14:4. From this it may be deduced that the frequency rises from childhood to the juvenile age group and strikingly declines in adulthood. In children and juveniles, the porotic and cribrotic types of the cribra orbitalia in the anterior half or in the entire roof of both orbitae were mostly observed. A mighty, trabecular type was likewise found only in children in three cases (I 421, 1/2 to 1 year, pl. 79:1; I 446, 3 years, pl. 79:3; I 403, 13—14 years, pl. 79:5). In adults it was generally a matter of remnants of fine cribra, often sporadic or scattered pits, narrowed by the overgrowing bone lamellae, possibly representing healing cribra (e.g. A 46 d, pl. 79:7, or A 6, pl. 79:8).

In three children with a development of cribra orbitalia, porotic hyperostosis was simultaneously observed on the

bones of the cranial vault, further cribra cranii on the inner surface of the same bones or a combination of both changes. In a 1/2—1 year old child I 421 (pl. 79:2) several small insulae of finely pitted structure are formed on both ossa parietalia and further, still finer, in the central line of the frontal scale (pl. 79:1). In a 2—3 year old child A 36/1 e (pl. 79:4) a triangular area (w. 40, h. 30 mm) of fine pitting was ascertained on the inner area of the frontal scale, merging in places into a honeycomb-shaped structure. A combination of the two forms was found in the above-mentioned 13—14 year old child I 403 (pl. 79:6) parallel with a strong form of cribra orbitalia. On his two parietal bones forward from the tubera parietalis two anterior-posteriorly oval insulae of plastic honeycomb-shaped structure (on the right 26 by 17 mm, on the left 13 by 8 mm) were formed. In addition, in the posterior part of both parietal bones two similar honeycomb-shaped strips (on the right 39 by 13 mm, on the left 38 by 16 mm) ran parallel with the sutura lambdoidea. Further areas of porotic hyperostosis were formed on the anterior halves of both temporal scales (on the right 33 by 28, on the left 25 by 14 mm), on the right in the healing stage, on the left almost smoothed over. Foci of cribra cranii were developed on the inner surface of the frontal scale on both sides of the crista galli on the right 20 mm, on the left 40 mm from the mid-line and on both sides up to 20 mm forward from the bregma, and further on the inner surface of the right temporal bone in an oval area (14 by 9 mm). These were honeycomb-shaped structures.

Radial striae on the skull convexity are likewise evalued as expression of anemia. They were not found in children and juveniles and only indicated in 8 adults out of a total number of 96 evalued skulls (8. 3%); out these 4 were males (8. 0%) and 4 females (8. 7%).

F) ORTHOPAEDIC DISORDERS

The light S-shaped kyphoscoliosis of the thoracic and lumbar spine of a 40—50 year old male (I 452, pl. 75:3—4) with bridging spondylosis was mentioned above (under heading C).

A much more expressed case of double S-shaped kyphoscoliosis of the thoracic and lumbar spine was found in a 28—32 year old male D 130 a (pl. 75:5—6). The middle section of the thoracic spine beginning at Th_5 to Th_{10-11} was arched to the left with a maximum between $Th_{7/8}$ (c. 1. 5 cm from the axis of the spine), the lower section of the thoracic spine as far as L_1 was arched to the right with a maximum at Th_{12} (about by 1 cm) and the lumbar spine again arched to the left with a maximum at L_3 (by about 0. 5 cm). The arching is conditioned by a wedge shape of the vertebral bodies in the sagittal plane, with a larger height on the convex side of the arching. Simultaneously the physiological thoracis kyphosis was accentuated forming an arched gibbus. It is interesting that, with the exception of initial osteophytosis of the lst degree on Th_{7-11}, no more massive osteophytosis developed.

Another case of S-shaped scoliosis of the thoracic spine affected a 30—40 year old male D 230 a (pl. 75:7). The vertebrae Th_{8-10} have a striking wedge-shaped form with a lowered right anterolateral margin, whereby sinistroconvex scoliosis is formed with a maximum on Th_8. As a mechanical support for the increased pressure on the right margin mighty osteophytic exostoses of the type of the bridging osteophytosis evolved between $Th_{8/9}$ and $Th_{9/10}$. As compensation Th_{11-12} acquired a contrary wedge-shaped form with a lowering of the left margin and dextroconvex scoliosis. The thoracic kyphosis was only slightly increased and the lumbar spine remained straight.

G) CONGENITAL ANOMALIES

Congenital anatomical deviations, mostly without clinical significance, were found in relatively large number, mostly in the area of the spine, including the sacrum. First we shall, however, consider anomalies of extraspinal location.

An anomalous process on the condyle of the mandible was found relatively often. It was formed in 4 cases, of this 3 males and 1 female, three times unilaterally and once bilaterally. In a 40—50 year old male A 13 (pl. 80:1) it runs from the frontal margin of the left condyle (h. 2 mm, b. 4 mm, prom. 3 mm), in a 30—40 year old male A 23 d (pl. 80:2) it starts 2 mm below the lateral margin of the left condyle (h. 10 mm, b. 5 mm, prom. 4. mm), in a 35—45 year old female I 448 (pl. 80:4) the right condyle is divided by a pit with a slightly spongiotic base (antero-posteriorly 6 mm, transv. 4, d. 3 mm) on the rounded lateral half and a small process forming the medial quarter. The surface is smooth, likewise so the cavitas glenoidalis of the right temporal bone, so that it was more likely a congenital than an acquired change. The medial half of the condyle on the other side is not preserved. The right condyle of a 28—32 year old male J 1949 (pl. 80:3) runs forward medially through a process of long conical pointed shape (l. 6 mm, diam. of base 6 mm).

On the posterior margin of the lower plane of the first right rib of a 40—50 year old female I 324 (pl. 80:5) an anomalous tubercle is formed (8 by 5 mm, h. 4 mm). The sternum of a 28—32 year old male I 444 (pl. 80:6) did not fuse between the 1st and 2nd sternebra and it fused only partially between the 2nd and 3rd sternebra (deep grooves remain from the sides). Furthermore, as a result of a disturbance in ossificiation, a smooth demarcated dehiscence formed along the central line of the upper part of the 3rd sternebra. The left ulna of 30—50 year old female I 406 (pl. 80:7) has a similar smoothly outlined aperture on the upper end of the crista musculi supinatoris. On the left tibia of a 40—50 year old male I 452 (pl. 80:8) a tuber runs 10 mm below the facies articularis fibulars. It is flattened in the anterior-posterior direction, semicircularly arched in the frontal plane (l. proximodist. 25 mm, b. anteropost. 11 mm, prom. 9 mm) and has a slightly rough surface.

Of spinal anomalies we include, first of all, the congenital vertebral blocks observed in two individuals. In an adult male (?) A 23 (pl. 81:1—2) C_2 and C_3 are merged in bodies, spines and arches, but slits of the intervertebral joints are preserved. In an adult male (?) A 42/1 (pl. 81:3—4) C_4 and C_5 are fused in bodies, but slits are preserved

between the arches, spines and intervertebral joints.

The atlas of a 25—30 year old female I 456 (pl. 81:9) has a thickened left massa lateralis and the left processus transversus is missing except for a small, now broken off tubercle. Backwards of the left fovea articularis a transverse apertura (foramen retroarticulare) is formed in the arch.

A total of 8 cases of spondylolysis were found in the whole series (pl. 82:1—4), 3 of which were situated on L_4 and 5 on L_5 (tab. 14:5). The overall frequency of 3% on L_4 and 5. 6% on L_5 corresponds to the "norm" observed in various populations (VYHNÁNEK and STLOUKAL 1977). Spondylolysis was ascertained in 7 individuals (1 year old child, 4 males and 2 females); in one of the males (I 444, pl. 82:2) simultaneously on L_4 and L_5. In most cases of spondylolysis (75%) the continuily is broken off symmetrically intraarticularly on the border of the medium and lower thirds of the cranial joint surfaces. In male I 411 (pl. 82:4) the arches of L_4 were interrupted symmetrically 5 mm below the lower margins of the facies articulares superiores. In male I 444 (pl. 82:2) the left arch of L_4 was interrupted 6 mm below the lower margin of the facies articularis superior, while on the right a secondary break was observed 7 mm below the lower margin of the same joint surface. It was a matter of unilateral (left-sided) spondylolysis.

On the sacrum a complete canalis sacralis apertus was observed in two males (D 123, pl. 83:1; I 444, pl. 83:2) and one female (I 401). Partial fissures of the sacrum — spina bifida of the lower sacral vertebrae — were discussed in Chapter 12, being a usual morphological variety. But in one case it was linked with a striking sinistroconvex scoliosis of the sacrum (female I 448, pl. 83:3—4).

In conclusion it can be said that in some individuals several anomalies clustered. E. g. the 28—32 year old male I 444 showed a disturbance of the fusion of the sternebrae, a dehiscence of the sternum, spondylolysis of L_4 and L_5 and a complete fissure of the sacrum.

H) DISEASE OF UNKNOWN ETIOLOGY

In the case of four individuals (three adult males out of ten with surviving nasal passages and one female out of six, i. e. together 25% of evaluated cases) a broadening of the thickness of the concha nasalis media to 4—6 mm was observed with an enlargement of the hollow space between its two surface layers and with a strikingly spiny surface relief. It is interesting that no similar enlargement occurred in the six children and one juvenile evalued. This peculiarity was noticed on material from ancient Egypt by SATINOFF (1968), who attributed it to pathological changes without further diagnostic evaluation. Some other series of ancient Egyptians, e. g. that of the Middle Kingdom to the Third Intermediary Period from Lisht (STROUHAL, in preparation) show striking frequency and extremely developed examples of this deviation, which can be labelled hypertrophy of the middle nasal shell.

On the right hip-bone of a 35—45 year old male J 1973 (pl. 84:4) (the left is not preserved) complete ankylosis of the sacroiliacal joint can be observed. The spine of the same individual was affected only with banale osteophytic changes (1st degree on C_2, C_5, Th_{3-8}, 2nd degree on C_1, L_4, L_5 and 3rd degree on L_3, the other vertebrae being without osteophytes) and there is no sign of spondylarthritis or osteochondrosis. For that reason ankylosing spondylitis (Bechterev disease) can be dismissed, and the diagnosis needs to be left open.

The head of the right femur of a 30—35 year old male I 457 (pl. 84:1—2) is enlarged and has an irregularly spongy, anterior-posteriorly flattened shape (diam. 59 mm. circ. 190 mm) with a strongly overlapping margin. The enlarged foveola (26 by 27 mm is filled with a new-formed bone, which exceeds the level of the surrounding articular surface. There are no visible signs of erosion or eburnisation. The right acetabulum is enlarged by way of adaptation (diam. 64 mm), its margin is thickened (up to 7 mm), irregularly rugged and the articular surface is slightly uneven. The left hip-joint is normal. At the same time the left tibia of this individual is visibly stronger and has more striking muscle relief than the right, which reveals a smaller functional load of the affected lower right extremity. According to the X-ray (pl. 84:3) the right femur has a flattened spongy head with strongly overlapping margin and structural irregularities of the inner shadow. The strikingly broad short neck is without changes of the collo-diaphyseal angle. We consider this case a Calvé-Legg-Perthes-Maydl disease (aseptic necrosis of the head of the right femur).

I) SENILE CHANGES

Changes observed in individuals of advaced age are usually given on the margin of the paleopathological picture. In our series including not many older individuals few such changes were observed.

On a fragmentary fragile skull vault of a 50—60 year old female J 1960 (pl. 84:6) a dish-shaped depression is formed medially from the right tuber parietale (from the back medially forward laterally 45 mm, perpendicular to this 32 mm, d. 4 mm), in which the bone is thinned to a mere 3 mm. Of a symmetrically located formation on the left only the posterior lateral margin is preserved. It is a case of the demarcated parietal atrophy.

In a 40—50 year old male I 449 (pl. 84:5) two fragments of completely ossified halves of the walls of the trachea were found among the unearthed bones.

On both sides of the manubrium sterni of an old individual A 36/3 D — 1 (pl. 84:7) a socket-shaped ossification of the cartilage of the first rib was ascertained.

Macroscopic symptoms of general osteoporosis (light and brittle bones) can be observed in four out of the total of 135 scanned adults (3. 0%), of this in one of the 75 males (1. 3%) and three of the 60 females (5. 0%). These are individuals at the age of 40—50 years (I 324, I 382/2, J 1483), with one exception of a 30—40 year old female (I 383).

J) PSEUDOPATHOLOGY

Perforated skulls create suspicion of malignant tumourous processes (primarily bone metastates of carcinoma of va-

rious organs or myeloma multiplex (STROUHAL and VYHNÁNEK 1981). For that reason attention has to be paid to them and they should be subjected to X-ray examination. In the Abusir material three cases were observed.

In the left parietal bone and in the left half of the frontal scale of a 40—50 year old male I 324 (pl. 85:1) four perforations (diam. 3—6 mm) with sharp as if punched out walls without vital reaction are visible, apart from defects due to fracture of the vault. Similar perforations (6 by 4 mm, pl. 85:3) were also found on the base of the left processus coronoideus of the mandible. According to X-Ray (pl. 85:2) they were simple apertures without changes in the surrounding, not distinguished from other postmortal defects. The perforations are located exclusively on the left half of the skull and are the result of some external postmortal influences that cannot be closer defined.

On the frontal scale of a 28—32 year old male I 444 a larger number of quite tiny apertures can be observed which arose by perforation of the base of the pits, visible on the inner surgface of the bone. According to macroscopic finds and X-ray (pl. 85:4) these are perforating granulations of Pacchioni.

On the frontal scale and the left parietal bone of a 40—50 year old female I 469 (pl. 85:5) three perforations were discovered (diam. 3—4 mm). According to macroscopic finds and x-ray (pl. 85:6) these also are granulations of Pacchioni, to which vascular canals lead.

DENTITION

A) STATE OF PRESERVATION OF THE DENTITION

Some authors of palaeodontological studies have pointed out to what extent the conclusions of morphological, orthodontical and decay studies are influenced by the state of preservation of the material, which, in the majority of series acquired by archeological excavations, is not usually ideal. BRINCH and MØLLER-CHRISTENSEN (1949) suggested that the degree of preservation be expressed with the aid of indices for both objects of study — the alveoli and the dental crowns. The comparative alveolar index (CAI) expresses the number of preserved alveoli in percentage of the ideal number of alveoli in a relevant number of persons under study. The comparative dental index (CDI) gives the number of preserved teeth in percentage of the ideal number of teeth of the persons under study. The difference between the values of both indices is, at the same time, the rate of the number of postmortally lost or damaged dental crowns.

The state of preservation of individual alveoli and teeth of the permanent dentition of the whole material from Abusir is given for both sexes in table 15:1. It shows a better state of preservation of the alveoli and particularly the teeth in the lower compared with the upper jaw. At the same time the number of preserved individual alveoli in the lower jaw is comparatively stable, which must be connected with the greater mechanical resistence of the mandible in comparison with the maxilla. In the maxilla the preservation of individual alveoli fluctuates more and is least for M_3 and M_2. The preservation of individual teeth fluctuates in both jaws identically; it is highest for M_1 and decreases in the direction towards M_3, and even more strikingly in the direction towards the frontal teeth with a minimum for I_1.

The preservation of dentition in relation to age groups is presented in table 15:2. The least preservation of alveoli and teeth is shown in the 20—29 year old category, the preservation rises in the older categories, while among the 15—19 year olds the greatest preservation of alveoli is shown with a slightly below average preservation of teeth (which leads to the deduction of a relatively largest number of postmortal losses of teeth). As to sex, in all categories of adults better preservation of alveoli and teeth can be seen in females compared with males, with the exception of juveniles, where the ratio is vice versa.

The total values of CAI and CDI (tab. 15:2) show more than a two third preservation of alveoli and more than half preservation of teeth. At the same time it can be deduced that the losses of teeth, which fell out postmortally from the alveoli, amounted to not quite one sixth. In the case of the first series (from inside the Mastaba) they were, in large part, due to manipulation with skeletal remains, among others, during the activity of grave robbers and quarrymen working in the Mastaba.

B) VARIATIONS IN THE NUMBER, POSITION AND MORPHOLOGY OF TEETH

The **frequency of hypodontic teeth** is given in table 15:3. Hypodoncy occurred most frequently in M_3 (11.9 %) without sexual differences, but slightly more often on the left than on the right. In one case (25—30 year old male A 10, pl. 86: 1—2) the absence of the upper right P_1 was ascertained with a slight diastema (2 mm) between the broken crown C and P_2 rotated by 45°, which thereby took part of the place of the missing P_1. Its aplasion was confirmed by X-ray. Likewise in one case (30—50 year old female A 21 d, pl. 86:6) hypodoncy of the lower right I_2 was found, its place being taken by the adjacent C, rotated by 60°. On the other hand, an increase in the number of teeth is given in a case of persistence of the lower left c between P_1 and C in a 40—50 year old female (I 448).

The **frequency of teeth in retention**, much smaller than that of hypodoncy, is given in table 15:4. It is limited only to canines and third molars. In one case (30—50 year old male A 36/6 a, pl. 86:3) the upper left C remained in the crypt in a horizontal position with the lingual surface upwards and the point mesially. In its place is a 5 mm diastema. There is an interesting case of three associated retentions (28—32 year old male I 444, pl. 86:5), in whom a number of other congenital anomalies were found, see p. 114. Both the lower C grew upward and mesially and were stopped by the distal side of the necks of I_2 (diastemas 2 mm). The lower left M_3 grew obliquely upward and forward, wedging into the border of the neck and crown of the adjacent M_2. Nothing can be said about the state of the opposite M_3 because it was intravitally lost. In a 20—25 year old male (J 1947, pl. 86:4) the lower left M_3 cut through in such a manner that it lies almost horizontally

on the alveolar process with the occlusive surface facing mesio-lingually. The cause of the anomalous eruption probably was the very early loss of the adjacent M_2—P_2 due to paradontosis. In a 28—32 year old male (J 1840) the upper right M_3 remained in the depth of the alveolus in transverse position with the occlusive surface facing bucally. In a 25—30 year old female (J 1946) the upper left C cut obliquely palatinally behind the adjacent incisors (crown broken off). Altogether, retention was found in 4 males and 1 female.

Variation in the position of teeth include, apart from the two cases of rotation mentioned above in describing hypodoncy, a further 13 finds. The most serious of these is the ectopic eruption of the upper left C (40—50 year old male I 452, pl. 87:1) by 6 mm palatinally, with the axis slightly bent palatinally, and a rotation of 45°. So-called narrow position of the lower front with crowded incisors was formed strikingly in six cases: in a 30—40 year old male A 44/2 d, in a 23—27 year old male (I 411, pl. 87:2) together with a 30° rotation of both lower C and a 45° rotation of the lower left M_3, in a 20—21 year old female (I 412, pl. 87:3) together with a similar rotation of these teeth, in a 23—27 year old female J 1970 with rotation of the lower left C by 45°, in a 30—40 year old male (D 334, pl. 87:4) together with a shift of the lower right P_1 by 3 mm bucally, and in a 30—40 year old female (J 1967, pl. 87:5) with a striking shift of the lower right I_2 by 4 mm lingually as well as with a shift of the lower right P_2 by 3 mm and an inclination of its axis, likewise lingually. The other variations affect only individual teeth. Thus, the two lower C of a 11—12 year old child (I 413) are rotated 45°, the upper right P_1 of a 16—17 year old girl (A 44/1 a, pl. 88:2) shows a 3 mm shift and an inclination of the axis bucally, the lower right C of a 30—50 year old female (A 21 d) is rotated 45°, the lower left P_1 of a 25—30 year old male (A 44/2e) has its axis bent lingually, the lower left missing P_2 of a 25—30 year old female (A 44/2 l) was — according to the alveolus — rotated 45°, the lower right P_2 of a 40—50 year old male (A 36/3 b) was — likewise according to the alveolus — rotated 30°, the lower left M_2 of a 30—40 year old male (A 19) shows a 2 mm shift and the inclination of the axis lingually and both lower M_3 of a 35—45 year old female (I 448) are rotated — the right by 20°, the left by 45°. On the whole, variations in the position of teeth occurred in seven males, seven females and one child.

Variation in the morphology of teeth where, by contrast, a less common find. They include a drop-shaped enamel pearl in the upper half of the mesiobuccal side of the upper left m_1 of a 4—5 year old child (A 36/10 a, pl. 88:1), two shovel-shaped upper I_2 of a 16—17 year old girl (A 44/1 a, pl. 88:2), anomalous shape of the crown of the upper right M_2 of a 19 year old male (I 407/1, pl. 88:3), resulting from the division of a mighty paraconus by a transverse groove into two separate cusps (on the opposite M_2 a normal paraconus can be observed). Further deviations are connected with the reductive tendency at M_3. Thus the upper right M_3 has the shape of cylindrical peg in a 25—30 year old female (J 1946, pl. 88:4), the lower left M_3 being hypodontic. The upper right M_3 has reduced dimensions (7 by 7 mm) and a simplified tricuspidal pattern in a 25—30 year old male (A 44/2 b, pl. 88:5). Finally, the lower right M_3 has smaller size (8 by 8 mm) and rounded triangular shape in a 28—32 year old male (D 130 a, pl. 88:6). Reduced (smaller) upper I_2 were found in a 30—40 year old female (A 29 d) and according to the alveolus in a 35—45 year old female (I 448).

The occurrence of Carabelli cusps could not be reliable assessed in the dentition of adults in view of the rapidly progressing attrition. It was, therefore, ascertained in children and juveniles. It occurred — symmetrically on both M_1 — in 5 individuals out of the total number of 47 scanned right M_1 (10.6 %) and 48 scanned left M_1 (10.8 %).

C) DENTAL ATTRITION

The nine-stage scheme of BROTHWELL (1963) in a modification by STROUHAL and JUNGWIRTH (1983) was used for the detailed evaluation of tooth attrition:

0 — no attrition
1 — slight attrition of the enamel (cusps bulging)
2 — larger attrition of the enamel (cusps flattened)
3 — point (or linear) attrition of the dentine
4 — areal (or band) attrition of the dentine
5 — extended attrition of the dentine with islets or bridges of the remaining enamel
6 — enamel completely removed, secondary dentine visible
7 — tooth crown completely or partially removed up to the root
8 — the same with pulp exposure

The average degree of attrition of individual teeth of both jaws according to age are given in table 15:5 and fig. 15:1. Since the differences between the two sides were insignificant and unsystematic (random), the results are combined for both sides. The average attrition of all teeth of both jaws does not differ, but differences were found in the attrition of the same teeth between both jaws. The lower incisors show systematically significantly greater attrition than the upper, in the case of the other teeth attrition is, on the contrary, greater in the upper than the lower jaw, or identical (with the exception of the greater attrition of the lower M_3 in 40—59 year old individuals).

As concerns individual teeth, greatest attrition in all age groups and in both jaws was found in ontogenetically oldest teeth — M_1 and I_1. Least attrition was shown in both jaws by ontogenetically youngest teeth — M_2 and particularly M_3.

The mean grade of attrition in regard to sex and age is given in table 15:6. In the upper jaw slightly greater attrition was found in the youngest and oldest age group in males compared with females, in the other two age groups the values of both sexes are almost identical. In the lower jaw greater attrition was found in 20—29 year and 40—50 year old males and 15—19 year and 30—39 year old females. In view of the lack of system in the differences found, we regard them as random.

The cause of the rapidly progressing attrition is usually sought in the admixture of silicious grain in food. Grinding stones are regarded as its source but high dust should also

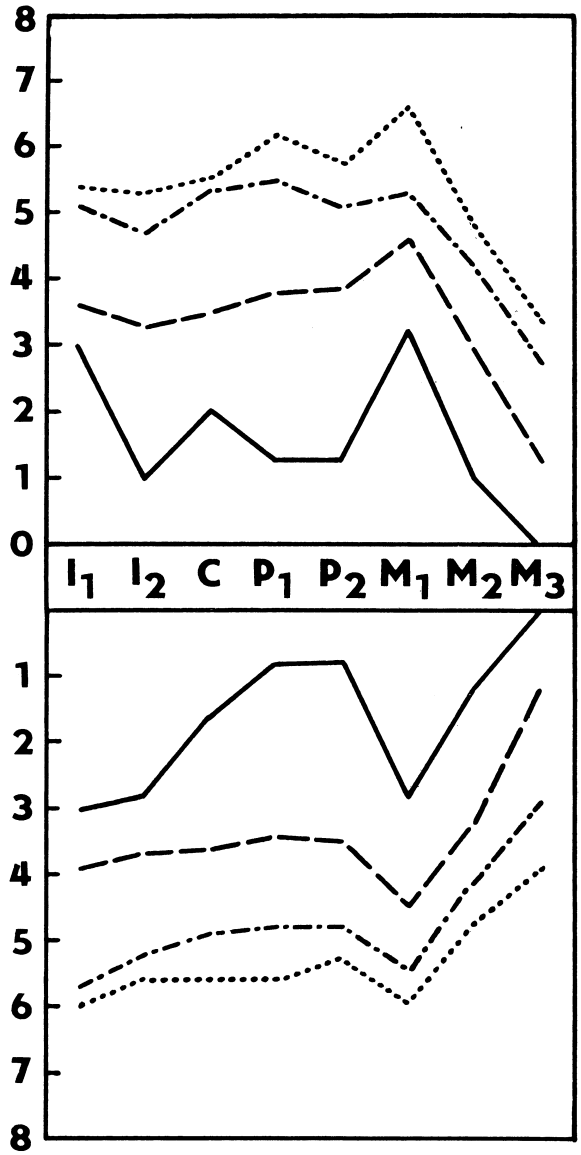


Fig. 15:1 Mean Degree of Attrition of Upper (above) and Lower Teeth (below)
Right and left sides are combined
———— 15—19. 9. years
– – – 20—29. 9. years
– · – · 30—39.9 years
..... 40—59.9 years

be taken into account in the Nile valley, where often sand whirled by the wind from the desert fills the air and penetrates everywhere. LEEK (1972) dealt in detail with the causes of strikingly intensive attrition in ancient Egypt.

Living teeth pulp protects itself agains progressive attrition by the formation of secondary dentine. It the attrition is faster than the speed of growth of this layer, pulpal exposure occurs (grade 8). Of 41 teeth affected by this extreme attrition in our series, in 23 (56.1 %) this led to the formation of a suppurative periapical focus, in 2 cases of isolated teeth (4.9 %) a possible focus cannot be identified, in 16 cases (39 %) no periapical focus was visible. In these cases it might be considered that either the loss occurred not long before death and there was not sufficient time for a focus to form or that the relevant individuals had a higher resistance against infection.

The final result of extreme attrition is the same as in deep caries — the loss of the affected tooth. In dentition with advanced attrition and without the occurrence of caries on surviving teeth the lost teeth can be regarded with great likeliness as the result of extreme attrition (e. g. in a 30—35 year old female J 1961, pl. 89: 1—2). In the majority of cases, however, in the age groups over 30 years it is not possible to decide whether the loss was caused by attrition or caries. Only in the younger age groups, in which no extreme attrition occurred in our series, intravital loss is the result exclusively of caries or paradontosis (see below).

Strikingly greater attrition of frontal teeth and premolars, specially in the lower jaw, if compared with the attrition of molars, was observed in eight cases (four males: 30—40 year old A 6, 40—50 year old A 13, 28—32 year old J 1949, pl. 89:4 and 6, 30—40 year old D 334, pl. 90:2; four 30—40 year old females: J 1807, J 1858, J 1891, pl. 89:5, J 1967). In addition, in another 30—40 year old female (I 294/1) there was intravital loss of the lower incisors with relatively small attrition of the molars. The question arises whether these individuals did not use the frontal teeth as a working tool, e. g. in dressing skins or other activity.

D) DENTAL CARIES AND ITS CONSEQUENCES

The frequency of paleopathological finds in single teeth of both jaws is given for both sexes and complexly for the whole series in table 15:7 and on figs. 15:2—3.

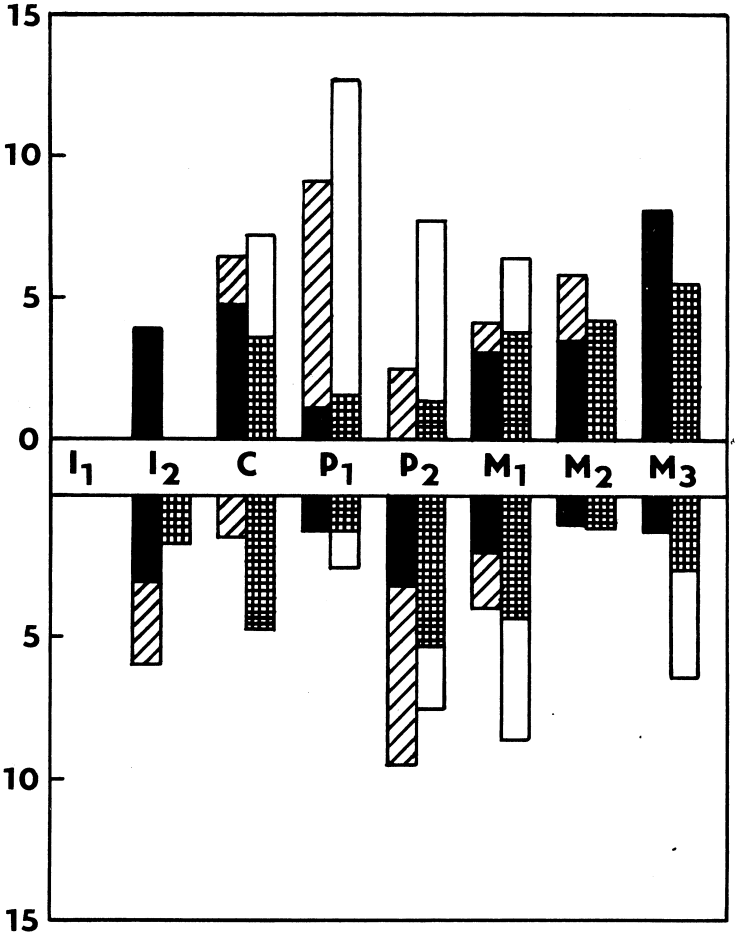
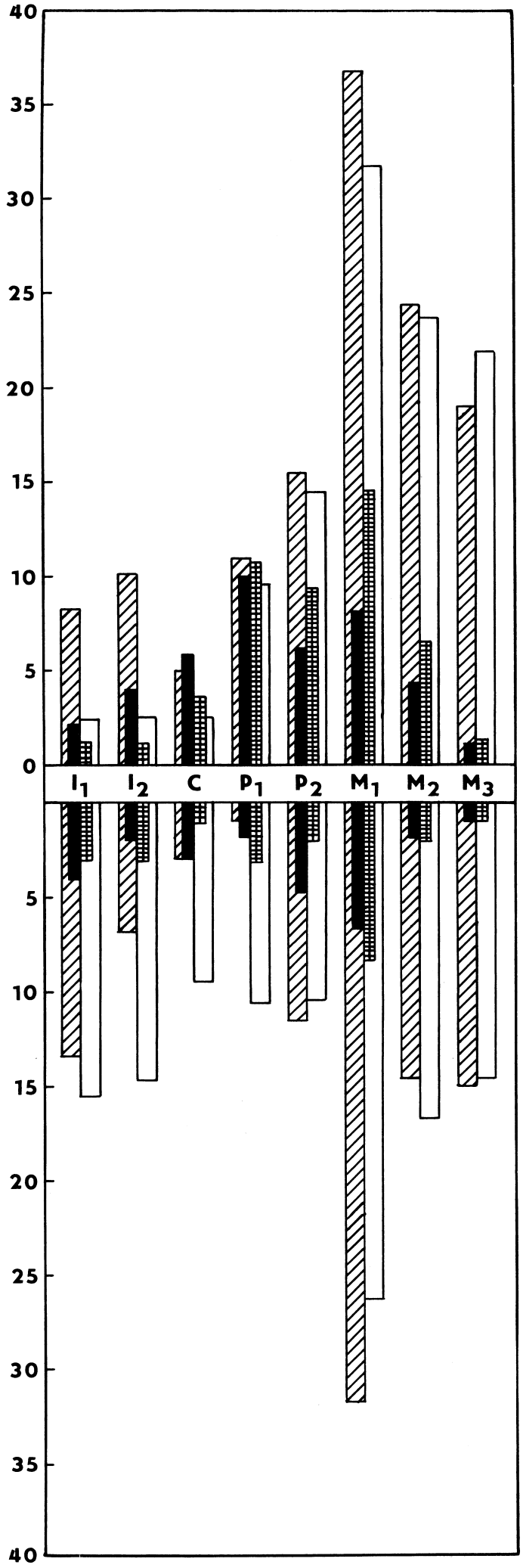


Fig. 15:2 Caries and Carious Destruction of the Crown in Single Upper (above) and Lower Teeth (below)
Right and left sides are combined
caries in males
caries in females
radices in males
radices in females



Both reveal that the upper teeth were affected by caries and its consequences more than the lower teeth. As to sexual differences, the results are not explicit. There is a little more caries in females in the lower jaw, the radix torsos in females in the upper jaw, intravital losses in males in the upper and females in the lower jaw and periapical foci in females in the lower jaw. Altogether females were slightly more afflicted.

Of individual teeth of the upper jaw caries occurred most frequently on M_3, further surprisingly on C, then on M_2, M_1, I_2 and least on P_1 and P_2. If we take into account the radices, the affliction of the premolars rises sharply, especially of P_1, which shows the highest dental decay. In the lower jaw, first in the occurrence of caries is P_2, followed by M_1, I_2, C and M_3, less by P_1 and M_3. Radix torsa were to be found most frequently on P_2, further M_1, M_3, I_2, less on C and P. The upper and lower I_1 were entirely spared of caries and no radices were found on the lower M_2.

Intravital losses exceed the number of caries and radices 2—3 times in the upper and 3—4 times in the lower jaw. It is clear that in their number losses of a different origin (attrition, paradontosis) are included. In both jaws they are most frequent on the molars and in the order M_1, M_2, M_3. In the upper jaw they are followed by P_2, P_1, I_2, I_1 and the least afflicted is C. In the lower jaw the further order is I_1, P_2, I_2, C and least afflicted is P_1.

Periapical foci, which are the consequence both of caries and attrition, have a similar frequency as the total of caries and radices. They are most frequent on M_1 in both jaws. In the upper jaw they are closely followed by P_1, then P_2, M_2, C, I_2, less frequently I_1 and M_3. In the lower jaw their occurrences is strikingly smaller and often M_1 follow I_1 and P_2, P_1 and I_2, C and M_2 and lastly M_3.

The frequency of paleopathological findings of the entire dentition in relation to sex and age are presented in table 15:8. In the course of ageing an increasing frequency of all scanned findings can be observed in both sexes (more in females than in males) most strikingly in intravital losses, least so in the occurrence of caries. SCHRANZ and HUSZÁR (1955) suggested a CRE index for general orientation in dental decay (the sum of percentage of caries, radices and intravital losses). This, too, shows a rising age trend and higher frequency in females compared with males.

The overall frequency of the scanned paleopathological findings on dentition shows a relatively favourable picture with regard to caries proper (2.5 %) and radices (2.1 %). This must be related mainly to the low mean age at death of the series and the low mean life expectancy (Chapter 7). In view of the fact that radices in the majority of cases were the result of caries that caused destruction of the crown, the sum of frequency of caries proper and radices

Fig. 15:3 Other Paleopathological Findings in Single Upper (above) and Lower Teeth (below)

periapical foci in males
periapical foci in females
intravital losses in males
intravital losses in females

expresses the dental decay of the set most precisely (4.6 %). Slightly less favourable is the frequency of intravital losses (14.1 %). It can be considered the result of decay only in the two youngest age groups where it reached a mere 0.4 %, resp. 3.3 %, while from 30 years upwards it was largely caused by attrition.

Dental decay (4.6 %) and the CRE-index (18.7 %) correspond to the data of European Neolithic and Early Bronze Age series (STROUHAL 1961, 1964). Similarly GRILLETTO (1979) gives decay at 4.03 % at Gebelen and 5.42 % at Asiut for Dynastic Egypt. It seems that the food of the ancient Egyptian popular masses did not include even in the Dynastic times any new cariogenous agents which would be introduced by the development of civilisation as compared with the agrarian-pastoral cultures of prehistory. In conformity with low decay there is also relatively low occurrence of periapical foci (4.4 %), parts of which, furthermore, need to be regarded as the sequelae of extreme attrition (see above).

The frequency of individuals with the occurrence of paleopathological finds in the dentition is given in table 15:9. It shows the increase of affliction from 1/6 to 1/4 of the number of individuals in the youngest age group to almost 100 % in the oldest age group. A comparison of the sexes shows higher frequency in males. In view of the fact that dental decay, intravital losses and the occurrence of periapical foci is, on the contrary, higher in females (tab. 15:8), this reveals greater intensity of affliction of a smaller number of females in comparison with males.

The kinds of dental caries according to age and sex are specified in table 15:10. It shows that the most common type of caries is the approximal, showing a gradual rise from the 20—30 year age group to the oldest. On the second place, but only in the two youngest groups, is fissural caries or caries originating in the foramen caecum. Occlusal caries occurs on an even level in isolated cases in all age groups. Relatively rare, clearly a result of the lower mean age at death of the series, was the finding of neck caries. Least frequent was caries on the buccal and lingual surfaces of teeth. The high frequency of approximal caries (e. g. 30—35 year old male I 457, pl. 90:1, 30—40 year old male D 334, pl. 90:2, 30—50 year old female I 406 with two approximal caries, pl. 90:3) can be explained by the observation that in a number of cases it might have originated by mechanical splitting of the edge of the teeth at higher stages of attrition.

Periapical foci were either limited to broadening the alveolus with the disappearance of the septa and the roughening of the bone structure or it was accompanied by the development of cysts and fistulae. E. g. in 30—40 year old male D 334 two fistulae are formed symmetrically on the hard palate. The right one (5 by 7 mm) is connected with a cyst with a diameter of 13 by 15 mm in the place of the upper right P_1 drained, furthermore, by a semicircular fistula (13 by 17 mm) on the outer side of the maxilla. The left one (7 by 9 mm) is connected with a periapical focus in place of the palatinal root of the missing upper left P_1, and with a similar focus in place of the buccal radix, drained by another fistula (Ø 5 mm) in the area of the apex of the outer surface of the maxilla (pl. 90:2). In a 40—50 year old male A 13 a cyst with a fistula originated as the result of occlusal caries of the lower left I_2 (pl. 90:4). Elsewhere as a result of the fusion of puruent foci of adjacent teeth a single cyst came into being. E. g. in a 30—50 year old female I 406 there is a longitudinal cyst (18 by 7 mm, d. 10 mm) in place of the lower right I_2 to P_1 with a rough trabecular to honeycomb structure (pl. 90:3). Sometimes occurred smoothing of the structure of the walls of the cyst, which might reach considerable size. As example we can quote a 40—50 year old male J 1976 with a globular cyst (15 by 12 mm, d. 6 mm) in the place of lower right M_2 which on its bottom opened the canalis mandibulae; by irritating the third branch of the trigeminus nerve it must have caused its bearer considerable pain (pl. 90:5). Further cases are a 40—50 year old female I 469 with a smoothed cyst (Ø 10 mm) in place of the upper left I_2 and a 40—50 year old male A 44/1 c with the loss of the majority of upper teeth and with a large rounded cyst (7 by 11 mm, d. 7 mm) in place of the buccal root of the upper right M_1 (pl. 90:6).

In conclusion it should be stressed that in the temporary teeth not a single caries or its sequelae were observed nor sequelae of extreme dental attrition. On the other hand, we give as example of relatively early massive dental decay (4 caries, 5 radices, 8 intravital losses and 6 periapical foci) dentition with relatively small attrition of a 25—30 year old male I 375 (pl. 91: 1—2).

E) DENTAL CALCULUS

The intensity of formation of dental calculus was evaluated with the aid of the BROTHWELL (1963) scheme as weak (forming narrow strips), medium (wider strips) and considerable (covering at least one whole side of the tooth). Further, attention was paid to the anatomical location of the calculus deposit. The results with regard to age and sex are summed up in table 15:11.

The last column of the table giving the overall frequency of dental calculus in individuals of our series shows its increase with advancing age (with the exception of 40—59 year old females probably as the result of their small number).

As to intensity of calculus formation, the 1st degree was found in almost 2/3 of all cases, the 2nd is less frequent and the 3rd least so. The 1st degree shows an increase in frequency from the first to the second age group. In the third age group the frequency remains the same and declines in the fourth, as in those groups the main occurrence shifts to higher degrees. The 2nd degree rises from the 20—29 year olds to the 30—39 year olds, in the oldest group it declines again, the influence of a striking rise in frequency of the 3rd degree in this age group as compared with the preceding.

In regard to localisation, in the 1st degree the main occurrence of calculus was found on the lower lateral teeth (mostly one or more molars), in the second place is the occurrence of calculus on the majority of teeth of the lower jaw. The 2nd degree was found most often on the teeth of both jaws and then — in equal number — on the upper or lower lateral teeth. The 3rd degree occurred usu-

ally in isolation only on molars, thrice on upper, thrice on lower and twice on both, with the rest of the dentition showing dental calculus of the 1st—2nd degree. Further, the 3rd degree appeared twice on all teeth of the lower jaw, with the upper teeth having 1st degree. In all cases it was a matter of supragingival deposits of calculus, only in one individual, a 30—50 year old female I 406, subgingival location was ascertained. As an example we can show a typical supragingival deposit of calculus of the 3rd degree on the lower right molars of a 30—35 year old male I 457 (pl. 91: 3—4) showing intensity of the 1st to 2nd degree on the other teeth. In this case it was clearly a matter of deposition on the teeth whose antagonists fell out soon so that self-cleaning by mastication did not take place.

As to sexual differences, table 15:11 shows that dental calculus prevailed in the younger age groups in females, in the older in males. Altogether, it occurred a little bit more frequently in females than in males. Its frequency in our series can as such be regarded as relatively large.

F) RESORPTION AND ATROPHY OF THE ALVEOLAR PROCESS OF THE JAWS AND THE QUESTION OF PARADONTOSIS

The degree of resorption of the alveolar process of both jaws was evalued according to the scheme by BROTHWELL (1963) as small (to the bifurcation of the radices), medium (to half the length of the radices and considerable (more than the half length of the radices). The results are given in table 15:12 according to age and sex.

The table shows that resorption of the alveolar process played an important role in the Abusir series and that most often its 2nd degree occurred. Resorption begins in youngest age group with the 1st degree, in the 20—29 year olds the 1st degree appears in half the cases and the 2nd degree in a further third, in the 30—39 year olds the 2nd degree occurs in half the cases and a further third shows the 3rd degree, with the rest of 1st degree (from 30 years upwards there are no individuals without resorption), and in the 40—59 year olds exclusively the 2nd (60 %) and the 3rd (40 %) degrees are present.

As to sexual differences, resorption is in all age groups and in the total strikingly more advanced in males compared with females. The cause of this difference cannot be sought in the differing speed of attrition where no striking sexual differences were shown, nor in differences in dental decay, which are insignificant and tend to place females in unfavourable light. We believe that resorption of the alveolar process, in spite of being a physiological process, connected with the ageing of the paradont, can be greatly speed up by pathological influences, especially by the development of paradontosis, which was probably greater in males than females.

Typical paradontal pockets were found in five individuals, three males (25—30 year old A 36/1a: around both lower M_1, 30—40 year old A 6, pl. 91:5: around the buccal radix of the left upper M_2, 30—50 year old A 21 c: around the lower left M_3) and two females (25—35 year old A 16: between the buccal radices of the lower left M_1, 30—40 year old female J 1958: a row of pockets around the molars). These examples and the relatively rapid advance of resorption of alveolar process simultaneously indicate that from the age of 25—30 years in intravital losses account has to be taken beside dental decay and attrition also of the possibility of isolated losses at the result of the paradontal disease.

Intravital losses of a larger number of teeth lead, after a certain period, to the complete disappearance of the alveolar process of the relevant section of the jaw, which we call atrophy. We can recognize its beginnings, limited to a section with two or more intravital losses, partial atrophy of both or one lateral third, occasionally of the frontal third of the jaw, and complete atrophy. These stages can occur in one of the two jaws or in both. The findings in our series are summed up in table 15:13.

The table shows that atrophy does not occur in the youngest age group and only sporadically in the second age group. Its frequency rises in the third age group and reaches its climax in the oldest age group, where most often we meet with partial atrophy of the mandible and with complete atrophy of both jaws and where atrophies of various types occur in almost two thirds of individuals.

Even if in the age group 30—39 years atrophy predominates in females, in the group 20—29 years it occurs only in males and among the 40—49 year olds a little more frequently in males than females. The predominance of atrophy in males also emerges in the total. This is in line with the more advanced speed of resorption of the alveolar process of the jaw in males compared with females. As an example of complete atrophy we can give the lower jaw of a 50—60 year old female J 1960 (pl. 91:6).

G) NOTE ON ORTHODONTICS AND OCCLUSION

If we omit inborn hypodoncy, sporadic retention and occasional shifts of the position and axis of individual teeth (described sub B), the series shows physiological conditions in regard to orthodontics. No anomalies of occlusion were found in the sense of mesio- or distocclusion, open or deep occlusion and the like. As to occlusion, normocclusion predominated (35 males, 25 females, i. e. 60 individuals of both sexes), with psalidodoncy of the frontal area occurring in rare cases, while labidodoncy is current (see tab. 12:1 c). As example we show the normocclusion with a perfect Spee's contact curve in a 25—30 year old female I 461 (pl. 89:3).

H) NOTES ON ERUPTION OF DENTITION

Even though the material was not so well preserved and numerous as to allow more profound study of teeth eruption, we wish to draw attention to some interesting observations.

The order of the eruption of M_1 in relation to the eruption of I_1 could be scanned in 16 children of the average age of 5 to 7 years. In modern times the traditional order of the "molar" type (M_1I_1) tends to be replaced by the

"incisive" type (I_1M_1) (VALŠÍK 1974). In our material the traditional M_1I_1 could be observed in seven cases, in one case (6 year old child I 400) both teeth reach to the margin of the alveolar part of the jaw. The remaining 7 cases do not provide clear information as the result of postmortal loss of teeth.

The order of eruption of M_2 in relation to the eruption of P_1P_2 was observed in 6 children of the age 9.5 to 12.5 years. The cutting of M_2 preceded the eruption of the premolars in 3 children (10—11 year old A 36/9 b, 10—11 year old A 36/12 b, 11—12 year old A 41) the same stage of eruption of both teeth was visible in 2 children (9—10 year old I 420, 11—12 year old I 413), and one case could not be clearly assessed. The eruption of M_2 preceding the premolars is considered an archaic type. I observed it in Neolithic and Early Bronze Age material from the territory of south-western Slovakia, among the Eneolithic inhabitants of Anatolia it was found by SENYÜREK (1956), more recently attention was devoted to it by SPINNLER (1977) in her study of Swiss prehistoric dentition.

The observation of eruption of M_2 in relation to age showed that it was truly speeded up. It was performed in 8 children aged 11.5 to 14 years. Only in two of them incomplete eruption of M_2 was found (in a 11—12 year old child A 41 M_2 was 3 mm below the level of the occlusive level of the other teeth; in a 12—13 year old child A 39 b 1 mm). In 6 other cases M_2 was already fully erupted within the given age limit.

Similarly **observation of the eruption of M_3 in relation to age** brought an identical result. It was completed in 18 individuals aged 15 to 22.5 years, whose age was determined according to the epiphysation of the skeleton and the fusion of the synchondrosis sphenoccipitalis. In two 14—16 year olds (male A 34, female A 26 a) the teeth in formation were still in the crypts. In two 16—18 year olds (male A 15 a, female A 44/1 a) eruption was just taking place, but, at the same time, in one 16 year old male (I 323), M_3 was already present. In all 10 individuals aged 18—22.5 years M_3 were fully erupted, only in one of them (20—21 year old female I 412) the upper M_3 lacked 2 mm to reach the occlusive level and were still rotated distobuccally by the occlusive surface, while the lower M_3 were already at the occlusive level. In three other individuals eruption could not be assessed for hypodoncy or retention of M_3. The premature eruption of M_3 has been considered an evolutionarily primitive type (SCHULTZ 1944, VALŠÍK 1964) and its more frequent occurrence was observed in Negroids (CHAGULA 1960).

The prevailing types M_1I_1, M_2 preceding P_1P_2 and the speeding up of the eruption of M_2 and M_3 suggests that archaic tendencies survived in the course of eruption of the permanent dentition in the ancient Egyptian series from Abusir.

CHAPTER 16

HISTOLOGICAL EXAMINATION

(A. NĚMEČKOVÁ)

In September 1981 we were presented with 19 specimens of various tissues that survived in small pieces from some of the burials in the secondary cemetery in the Mastaba of Ptahshepses at Abusir. The age of the specimens ranges from two to more than two and a half thousand years.

Macroscopically, the tissues were dry, brittle and of dark-brown colour. They were designated as tissues of the skin, muscle fibre or organic remains. The epidermis and the corium in relevant samples were compressed so that their total thickness did not exceed 3 mm. In addition to the skin we investigated likewise hairs, which survived only in tiny fractions.

A number of authors have concerned themselves with processing natural or mummified tissues. The first experiments on them were carried out by CZERMAK (1852), later on by SMITH (1906), RUFFER (1910), GRAF (1949) and SANDISON (1955), more recently by GIACOMETTI and CHIARELLI (1968), RABINO-MASSA et al. (1967, 1972) and other authors. At the Histological and Embryological Institute of the Faculty of Medicine, Charles University in Plzeň we have been concerned with this problem for a number of years (NĚMEČKOVÁ 1973, 1977, 1984). We have to appreciate the achievement of M. A. Ruffer, who was the first to elaborate a method how to treat mummified tissues so that they might become capable of being cut with a microtome and stained.

A) METHOD

Before processing the specimens, it was necessary to remove secondary impurities. Hence they were gradually immersed in alcohols ranging from 70 % to 96 %. During the first 24 hours a considerable quantity of unnecessary matters were dissolved, which did not, however, include resins used for mummification. The bath became turbid and turned out red-brown. The exchange of alcohols that were applied in progressive concentration took 3 days. Small pieces of tissues were then fixed in 10 % formaldehyde and transferred over metacrylate into paraffin. We tried the following methods for staining the tissues: hematoxylin and eosin, orcein, Van Gieson's method and the modification of Golgi's method after Bubeinat. Only hematoxylin and eosin, however, brought positive results. Although we prolonged the staining time when applying all the other methods, no good issues were achieved. This failure must be ascribed to the preserving matter that had not fully dissolved in formol and thus prevented the stain from permeating through the tissue.

B) RESULTS

Of the 19 specimens examined, we were successful in processing histologically only the skin, muscle, brain and hair.

When processing the skin by the hematoxylin-eosin method, the stratum corneum remained unstained. The corium was arranged in layers running parallel with the surface and was heavily compressed, whereby details were almost completely wiped off.

In the corium we found many hairs (pl. 92:1). A cross-section of the hair revealed tiny granules of brown pigment. The sweat glands were, for the most part, so damaged by dessication that they had lost their ability to inflate again in diluted alcohol. We managed to identify only very few of them. Dessication of the tissues resulted also in a considerable deformation of the blood vessels so that we had to take into consideration also the possibility of artifacts. One of the specimens displayed a great number of small cavities. Evidently these represented blood vessels which retained some remnants of the connective tissue walls. Inside the blood vessels cells could be distinguished, which we took for erythrocytes (pl. 92:2). In some places these cells formed big clusters, elsewhere they were freely scattered.

Histological treatment of specimen J 1890 proved muscle fibres. A similar character was shown on specimen J 1744 (pl. 92:3). Unfortunately, we failed to make the transverse striation on these fibres visible despite our efforts to incite them with acetic acid and glycerol. The possibility that they may have been fibres from some bandages of plant material mistaken for muscle fibres was ruled out by further investigation: the structure of the fibre in question corresponded neither to flax nor hemp fibres.

In specimens where the remains of hairs were discovered we traced the proportion of the cortex to the medulla after clearing up these fragments and mounting them in Canada balsam. Highly damaged though they we-

re, we could recognize the hair structure even when examining only tiny fractions, Thus, for instance, specimen J 1807 appeared rich in pigment, while others, containing no pigment, proved to be surprisingly fair hairs.

Prepared beforehand in sections, our specimens of the brain tissue revealed blood vessels with remnants of the connective tissue walls (pl. 92:4). In the adjacent tissue, however, we did not succeed in disclosing any further cell structures. In these investigations we likewise adopted the hematoxylin-eosin method as no positive outcomes were attained by the impregnating method.

C) CONCLUSIONS

The study of ancient tissues showed structures entirely comparable with normal recent tissues. We aimed our efforts at discovering the cause of changes brought about by artificial interference, e.g. the application of various methods of mummification or pathological influences, i.e. various diseases that a given individual may have suffered from. Simultaneously, we succeeded in working out a suitable method how to treat preparations of naturally and artificially mummified tissues and their histological determination. On the basis of this method it is possible to distinguish reliably various types of tissues. The study of the specimens from the secondary burials in the Mastaba of Ptahshepses led to determination of the skin, muscle and brain tissue, blood vessels and erythrocytes as well as hairs.

ARCHAEOZOOLOGY

(J. BENEŠ)

The archaeological osteological material from the Mastaba of Ptahshepses revealed the remains of ten kinds of mammals (domestic and wild), four kinds of birds and two kinds of reptiles. We give first a specification of individual burials and other archaeological areas (see plan of the Mastaba) with their archaeozoological content. The subsequent part comprises a survey of the species present and describe the characteristic features of the remnants found.

A) ARCHAEOZOOLOGICAL CONTENT OF THE FINDS NEAR THE BURIALS AND IN OTHER ROOMS OF THE MASTABA

Burials A 6 — A 9

Fragments and parts of bones, all whitish in colour, with disintegrating compact substance; they include cattle, jackal, ibis and crocodile.

Cattle—fragment of the intermaxilla and fragments of the bones of the front and back legs, with marks of cutting and slashing with sharp tools — clearly food leavings

Jackal — 2 lumbar vertebrae and a metatarsal bone; relations to the fragments of a jackal from the vicinity of burials A 12 and A 13 unclear

Sacred Ibis — right arm bone, whitish in colour, unfossilized, perhaps secondarily added younger material

Crocodile — cervical and thoracic (?) vertebrae with broken off processes

Burial A 12

Yellowish animal, bones well preserved, some primarily damaged (food leavings); part of the bones of a jackal belonged to the same individual as the bones in A 13, the second part (coloured whitish) belonged to another individual and may have been secondarily added.

Jackal — individual I: lower right jaw (proved to belong to the lower left jaw in A 13), fragments of ribs, lumbar vertebrae and the pelvic bone, bones of the back legs (one fragment with greenish colour, the result of contact with a copper or bronze object). Individual II: vertebra and fragment of the shinbone

Antelope — two fragments of shin bones, belonging to two different individuals

Cattle Egret — fragment of the tarsometatarsus

Egret of undetermined species — fragment of the tibiotarsus

Crocodile — thoracic vertebra with damaged processes and marks of teeth of a predator (jackal?) on the caudal surface of the body of the vertebra and damaged lumbar vertebra

Monitor — thoracic and lumbar vertebrae

Vicinity of Burial A 12 and the NE Corner of Room 23

Fragments of yellowish colour belonging to cattle and a crocodile

Cattle — seven primarily broken fragments of various bones — food leavings

Crocodile — fragment of the upper right jaw without teeth, three lumbar vertebrae and fragment of a further vertebra secondarily broken

Burial A 13

Fragments yellowish-white or yellowish in colour; the bones of the jackal belong to the same individual as those in the vicinity of burial A 12

Cattle — fragment of the shin bone and other fragments, which belong either to cattle or an antelope

Jackal — skull with a damaged brain case, lower left jaw, two vertebrae, fragments of ribs, ulna, right pelvic bone, bones of the back legs upper jaw of a young milk teeth (DC and DP^4)

Antelope — fragments of vertebrae (one fragment seared), fragment of the pelvis, fragment of the femur, gnawed by a dog or jackal, fragment of a phalanx I

Crocodile — cervical and thoracic vertebra and cervical rib

Burial A 18

Bones of a dog of smaller breed, one individual perhaps ritually deposited

Dog — radius and ulna, metacarpal, femur and shin-bone

Burial A 19

Lower jaw of a dog and fragment of the femur of cattle

Dog — lower right jaw, which does not belong to the same individual as the fragments of the dog in burial A 18

Cattle — distal head of the left femur

Burial A 20

Bones of light colour (almost white), all broken and disintegrating

Cattle — upper and lower molar and fragments of other upper and lower teeth, slightly worn out (young animal)
Sheep or goat — fragment of the lower right and left jaw of one individual
Fish (Bichir?) — fragment of the skull bone with a ray-shaped structure

Burial A 36/4
Two damaged bones, dark brown in colour
Dog — first cervical vertebra
Sheep or goat — fragment of the left radius

Burial A 36/7
Two fragments of bones
Dog — lumbar vertebra
Antelope — arm bone of an immature individual

Burial A 36/8
Jackal — thoracic vertebra

Burial A 39
Undetermined fragment of a skull, perhaps a sheep

Burial A 40/B
Dog — cervical vertebra of a young individual, belonging probably to the same animal as the vertebra of the dog in A 44/2

Burial A 42/2
Calf — lumbar vertebra

Burial 44/1
Dog — skull without lower jaw; teeth ground to the roots — very old individual

Burial A 44/2
Dog — cervical vertebra; it may have belonged to the same individual as the vertebra in A 40/B
Jackal — lumbar vertebra

Burial D 84
Antelope — several small fragments of the skull
Undetermined rodent — femur of a young individual

Burial D 123
Clearly food leavings
Cattle — fragment of the lower right jaw considerably damaged and disintegrated (perhaps secondarily added), fragment of the left pelvic bone
Sheep or goat — two lumbar vertebrae
Other undetermined fragments of animal bones, small, light ochre in colour

Burial D 135
Clearly food leavings
Cattle — bones of the front legs (not of one individual) with a dog's or a jackal's teeth marks; fragments of the horn, almost white, partly abraded (indicates transport — clearly secondarily added material)
Antelope — cervical vertebra of one individual, fragments of ribs, fragment of the ulna and radius, and fragment of phalanx I

Burial I 387
Undetermined bird — two cervical vertebrae

Burial I 394
Dog — vertebrae and the left arm bone, all well preserved and belonging to one individual

Burial I 400
Cattle — fragment of the lower jaw, slightly disintegrated

Burial I 411
Cattle of a large breed (buffalo?) or camel — fragment of the proximal head of the arm bone

Burial I 415
Antelope — fragment of a patella

Burial I 417
Cattle — fragment of the lower jaw and fragments of teeth of another, younger individual

Burial I 452
Calf — one tooth

Burial J 1606
Cattle — fragment of a lower molar

North of Rooms 1 — 6, Square XII, f, g
Cattle — the distal head of the right arm bone

Room 6, Square III h (floor of the room)
Mostly fragments (one seared), clearly food leavings
Cattle — fragment of the skull, fragment of the lower jaw, fragments of teeth, fragments of ribs, and leg bones, primarily broken
Sacred Ibis — fragment of the tibiotarsus, recent in a appearance (added material?)

Room 13, Square 16 G (floor of the courtyard)
All fragments primarily broken, with marks of cutting; mostly remnants of food
Cattle — isolated teeth and fragments of teeth (mostly upper), fragments of ribs, fragments of leg bones

Room 17
Scattered bones primarily and secondarily broken; mostly remnants of food
Dog — upper tooth (P^4)
Cattle — fragment of a arm bone
Camel or buffalo — fragment (very small and disintegrating) of the second cervical vertebra
Pig — lower right and left jaw of one individual, lower right jaw of another individual (with a pathological callus under the first molar), isolated teeth, thoracic vertebrae of a young individual, fragment of a lumbar vertebra, two fragments of ribs, the right and the left arm

bone (perhaps of one individual) and the metacarpal bone

Room 18

Small fragments, crushed and perhaps even secondarily added

Cattle — fragment of the proximal head of the metacarpal bone

Crocodile — fragment of a rib

Small indeterminable fragments (9 pieces)

Rooms 21 — 23

Scattered bones, mechanically damaged, obviously moved to a different place

Cattle — isolated teeth of at least two individuals, and fragment of the right scapula

Jackal — cervical and thoracic vertebrae, perhaps of the same individual

Crocodile — cervical vertebra, seared on the right side (perhaps secondarily — not very likely food remnants)

Room 22, above the floor

Animal bones, both disintegrating (cattle) and not disintegrating (sheep); clearly remnants of food from different periods

Cattle — upper milk tooth, three strongly disintegrating fragments of the lower jaw, damaged thoracic vertebra and damaged talus

Sheep or goat — thoracic vertebra of a young individual and two fragments of ribs

Room 23

Remnants of at least two crocodiles, an adult (individual I) and one not quite adult (individual II) and several vertebrae of monitors, further, bones of cattle and sheep or goats; the bones of the crocodiles and perhaps of the monitor come from the ritual deposition of the animals, the bones of cattle and sheep are remnants of food; on some bones of the calf were remains of sinews and cartilage — clearly added younger material

Cattle — fragments of the incisors of the calf, fragment of half the pelvis of an adult individual, fragment of the pelvis of a calf of very recent appearance (with remains of sinews and cartilage), astralagus with marks of sinews and cartilage and another astralagus with marks of cuts and slashes on the lateral side

Sheep or goat — fragment of the lower right and left jaw

Jackal — isolated upper molar, clearly secondarily added

Crocodile — individual I: fragment of the skull (quadratum dext., maxilla et jugale dext. et sin.), fragment of the lower jaw (articulare sin.), cervical, thoracic and lumbar vertebrae, rib, both arm bones, pelvic bone and femur, armour plates.

Individual II — fragment of the skull (quadratum dext.), thoracic vertebra and both femurs

Monitor — 5 thoracic vertebrae, forming a continuous row, and two isolated til vertebrae, perhaps of the same individual

Fish (?) — undetermined fragment with a ray-shaped structure

Room 23, in the place of the disturbed floor

Pig — upper right and left jaw with part of the hard palate

Crocodile — lumbar vertebra and fragment of a rib (perhaps belonging to individual I of the preceding)

Undetermined fragment of a bird skull

Room 23, Lowest layer

Bones yellowish in colour, mostly isolated

Cattle — fragments of phalanges

Pig — fragment of the lower right jaw

Jackal — isolated upper molar and fragment of the shin-bone

Undetermined fragments of bird bones

Crocodile — thoracic vertebra, 4 ribs and 6 armour plates

Monitor — damaged tail vertebrae

Room 23, Square G 2

Armous plate of a crocodile (4 back and 2 side armour plates)

Room 23, Square G 3

Various bones, yellowish in colour; well preserved crocodile bones; mammal and bird bones in fragments

Cattle (?) — ten different fragments

Sheep or goat — isolated upper molars of an older individual

Undetermined fragment of a bird bone

Crocodile — upper left jaw, 2 thoracic vertebrae, 4 lumbar vertebrae, 2 tail vertebrae, 2 cervical ribs, 3 thoracic ribs, left scapula and left coracoid, both femurs (with dog or jackal teeth marks) and 4 armour plates; clearly the bones of one individual, perhaps with bones of other individuals mixed up (mainly vertebrae)

Room 23, Square G 4

Crocodile — cervical vertebra and two armour plates

Monitor — shoulder girdle (left), slightly damaged

Room 24, lower layer

Large numbers of bones and fragments, yellowish in colour

Dog — ulna

Cattle — fragment of a corn of the horn, fragment of the lower left jaw, fragment of the scapula, metacarpal bone, fragment of the metatarsal with marks of a rodent's teeth and the phalanx of a not quite adult individual

Buffalo (?) — strongly disintegrated fragment of the first cervical vertebra

Sheep or goat — lower left jaw and fragment of a rib

Pig — fragment of the skull

Jackal — two cervical vertebrae, right radius and ulna, both femurs and fragment of the fibula

Stork of undetermined species — not very large fragment of the left scapula and fragment of a tarsometatarsus

Undetermined fragments of bird bones (2 pieces)

Crocodile — thoracic vertebrae and 4 lumbar vertebrae of one individual and fragment of the ulna

Fish (Bichir?) — fragment of the shoulder girdle

Room 27
Scattered bones in various states of preservation; the sheep and camel bones are perhaps recent
Sheep or goat — occipital part of the skull, grey in colour and strongly disintegrated
Camel — phalanx I, grey-white in colour with remnants of sinews
Jackal — cervical vertebrae of two individuals and fragment of the pelvis
Antelope — fragment of the corn of the horn, fragments of teeth, fragments of vertebrae, fragment of the femur and metatarsal bone.

Room 30
Sheep — one vertebra, young individual
Dog — one vertebra

Room 32, Square A 7, lowest layer by the small E gate
Bones, mostly badly broken, disintegrated in various ways, some seared — all scattered food remnants
Donkey — carpal bone and astralagus
Cattle — isolated teeth and fragments of teeth (mostly upper), fragment of the right arm bone, fragments of ribs, fragments of metacarpal and metatarsal bones and phalanges — all of several individuals, mostly young animals
Pig — 2 upper molars of different individuals

Rooms 33 — 39, Layer O — 2 m from the top
Cattle — upper milk molar (young animal) and fragment of the proximal head of the metacarpal bone
Sheep — point of the corn of the horn, spirally twisted, straight (ancient Egyptian thin-tailed sheep)

Room 40
Bones, all of recent appearance, some with marks of cutting — clearly food remnants
Cattle — fragment of the corn of the horn, fragment of the frontal bone, fragment of the upper right jaw with teeth, fragment of the lower jaw of a calf, isolated molar, damaged thoracic vertebra, small fragment of the scapula and the proximal head of the arm bone — remnants of several individuals of various age and perhaps different breed
Pig — fragment of the lower right jaw with teeth

B) ANIMAL SPECIES PRESENT

Of domestically bred mammals the material contains the dog, donkey, cattle, sheep or goat, camel and pig.

The **dog** (Canis familiaris LINNÉ) was identified in remains of several individuals of a small breed. These were found more often among material from the vicinity of the burials (15 pieces) than in other areas (only 3 bones). The larger skeletal units come from close to burials A 18 and I 394. The skull without the lower jaw, found near burial A 44, belonged to a very old individual because the teeth are ground down to the roots. The remains of a dog, primarily the skull and larger bone remains, are clearly remnants of ritual deposition, individual bones (mostly isolated vertebrae) might represent accidentally scattered material.

The **donkey** (Equus asinus LINNÉ) was found only in room 32, square A 7. There was the right heel bone and the right carpal bone. It might represent either food leavings or material that was secondarily mixed up (e.g. from a dead sumpter mule).

Cattle (Bos taurus LINNÉ) is the species of domestic animals present in largest numbers (10.6% of all determinable material, excluding fragments). It is present in greater number in other areas than the vicinity of the burials. The remains of young individuals predominate. No larger skeletal units were found. Marks of cutting and stabbing with sharp objects (e.g. a knife or fork) on the bones, seared fragments and bones that were primarily broken (i.e. before deposition in the soil) show clearly that these are food leavings. The number of individuals cannot be stipulated as the meat was brought to the site already cut into pieces. The deposition of the cattle must have occurred at different periods of time and under different circumstances as bones with remnants of dried cartilage and sinews were found by the side of bits of strongly disintegrating or partly fossilized remains (room 23).

Sheep or goat (Ovis sp. seu Carpa sp.) were found in small numbers and primarily in other areas (10 pieces) than in the vicinity of the burials (only 5 pieces). The bones and teeth of young animals appeared relatively often. Individual bones scattered in various areas prove that these are again foot leavings cut up mostly in other places. The relatively limited number of remains found (only 15 pieces) does not make the distinction of species nor closer data on breed possible. In room 33 — 39 a single preserved corn of the horn was found; it is straight and twisted spirally and points to the ancient Egyptian thin-tailed sheep (Ovis longipes palaeoaegypticum DUERST et GAILLARD), known on depictions from the earliest period to the time of the New Kingdom.

The one—humped camel (dromedary) (Camelus dromedarius LINNÉ) is reliable proved only by the find of a single phalanx I in room 27. The phalanx is coloured greyish-white, completely preserved even with fragments of sinews and must date from a later period. The other three finds (room 17 — fragment of a cervical vertebra, room 24 — ditto, near burial I 411 — the joint surface of the proximal condyle of an arm bone) are too fragmented for detailed determination. Apart from a dromedary they might also belong to a large breed of cattle or buffalo.

The **domestic pig** (Sus scrofa LINNÉ) was not found in the vicinity of any burial, only in the other rooms. A more numerous find came from room 17 (11 pieces out of the total of 17 pieces), but not even those form a larger skeletal unit, only bits of at least 2 — 3 individuals of various age. All remains of pigs are undoubtedly food leavings. On one lower jaw with strongly ground teeth (old animal) there was a pathological callus under the first molar (M_1) where the jaw was broken apart. The inflaming process, caused perhaps by the consequences of an injury to the animal which might have been the cause of the callus forming, shows that we are dealing with remains of animals bred domestically but with relatively little care.

From among mammals living in the wild, remains of jackal and antelope were found. The femur of a small rodent, which could not be more closely determined, found in the vicinity of burial D 84, is practically of no significance.

The **jackal** (Canis [Thos] aureus LINNÉ) is present relatively frequently (46 determined pieces), to a large extent in the vicinity of the burials. There are, in the first place, larger piles in the vicinity of burials A 12 and A 13 and in rooms 24 and 27. The finds in other rooms are made up merely of individual vertebrae or teeth, clearly secondarily scattered or mixed up.

In the vicinity of burial A 12 a lower right jaw was found without teeth, fragments of ribs, lumbar vertebrae, a sacrum and the bones of the back legs. In the vicinity of burial A 13 a skull was found with damaged brain case, the lower left jaw, cervical and thoracic vertebrae and the bones of the front legs. Since the right lower jaw of A 12 and the left one of A 13 belonged to the same individual, and since also the size of legs and vertebrae are identical, it can be responsible stated that the bones of the two finds belonged to the same individual, which might have been ritually buried and whose remains were secondarily scattered. This is further upheld by the fact that a crocodile was ritually deposited in room 23, where burial A 12 belongs and that on one bone from near burial A 12 there is greenish colouring, which arose by contact of the bone with a copper or bronze object. An interesting find of a fragment of the upper jaw of a young jackal with milk teeth (DC and DP^4) also comes from the vicinity of burial A 13.

The second larger complex of bones, belonging perhaps to the same individual, comes from a lower stratum in room 24. Isolated vertebrae and groups of vertebrae from burials A 6 — A 9, A 36/8, A 44/2 and rooms 21 — 23 and 27 belong to other individuals than the complex from the vicinity of A 12 and A 13. The vertebrae found in room 27 belong to at least two different individuals.

Apart from several isolated bones the **Antelope** (Oryx algazel PALLAS) is concentrated in three groups: the vicinity of burials A 12 and A 13, the vicinity of burial D 135 and a find in room 27. The find near burials A 12 and A 13 is composed of vertebrae, fragments of the pelvis and fragments of the bones of the back legs of at least two individuals. The thoracic vertebra, which is seared, proves that the bones found were food leavings. The pile in the vicinity of burial D 135 is made up of cervical vertebrae, fragments or ribs and small remnants of the ulna and radius, all parts of one individual. The group from room 27 is interesting. It does not come from one individual, is rather fragmentary and preserved in highly differing manner. A fragment of a horn made the probable determination of the species possible. The length of the bones of the legs point to the East African Oryx or Beisa antelope (Oryx beisa RUPP) or the Scimitar Oryx antelope (Oryx algazell PALLAS). The ancient Egyptians knew both species well and several depictions have survived. The horn bent into a large arch suggests the Scimitar Oryx antelope since the Beisa antelope has a straight, unbent horn.

Birds are represented exclusively in water fowl: the cattle egret, another egret of undetermined species, a stork of undetermined species and a sacred ibis[58]. The number of fragments found is small (7 determinable fragments and 7 indeterminable fragments of bird bones).

The **cattle egret** (Bubulcus cf. ibis LINNÉ) appeared in one single fragment of a tarsometarsus in the vicinity of burial A 12.

An **egret of undetermined species** (Ardea sp. indet.) is present in two fragments, likewise from the vicinity of burial A 12.

A **stork of undetermined species** (Ciconia sp. indet.) represented by a fragment of the scapula and a fragment of a tarsometatarsus, was found in room 24.

The **sacred ibis** (Threskiornis aegypticus (LATHAM)) was lifted in the vicinity of burials A 6 — A 9 (fragment of a scapula) and in room 6, square III h (fragment of a tibiotarsus).

Indeterminable fragments of bird bones (Aves sp. indet.) came from the vicinity of burial I 387 and from various places in room 23 and room 24.

In view of the small number of bird bones found it is difficult to express an opinion on their origin and use. Perhaps only the fragments of the ibis might have been ritually deposited, but a mere two fragments of very recent appearance suggest that this is secondarily mixed up material.

Reptiles are represented only in two kinds, the crocodile and the Nile monitor, but their bones are so numerous that they represent one third of all remains found.

The **Nile crocodile** (Crocodilus niloticus LAURENTI) as such forms 18.3 % of all determinable fragments. Its presence as a sacred animal in the Mastaba is no surprise. It was found in the vicinity of burials A 6 — A 9, A 12 and A 13 and in rooms 18 and 27 (all isolated fragments or only small units). Large skeletal remains were found in rooms 23 and 24 (to which possibly certain bones from the vicinity of burial A 12 belong). In those rooms incomplete skeletons of demonstrably two individuals were found, a larger and a smaller one. The skeleton of the larger individual is more complete, even fragments of the skull are preserved (a fragment of the upper right jaw is among the bits from the vicinity of burial A 12) and numerous back and side armour plates. The smaller individual lacked skull and bones of the front legs. In room 23 further vertebrae were found, coloured and preserved in different manner, which may have belonged to another (third) individual. As a whole, it can be stated that at least two crocodiles were ritually deposited in rooms 23 and 24. The isolated bones in the other rooms and in the vicinity of burials can be regarded as added material.

The **Nile monitor** (Varanus niloticus LAURENTI) was likewise well-known to the ancient Egyptians. It was considered the most dangerous enemy of the crocodiles as it was said to search for crocodile eggs, destroy them and devour the hatched young crocodiles. Present-day zoologists do not agree with this view but do not exlude the possibility that the monitor may occasionally not have

58 The bird bones were identified by RNDr. P. Švec, of the Department of Paleontology of the Faculty of Natural Sciences of Charles University in Prague, to whom we would like to express our gratitude.

spurned eggs and young of the crocodile. All remains of monitors, numerically fewer than the finds of crocodiles, come from room 23 and the vicinity of burial A 12. With the exception of two bones of the front legs the rest are all vertebrae (thoracic, lumbar, and tail), which differ from those of a crocodile by their strikingly darker colour, the result of part fossilization. In great likelihood all fragments of monitors found belong to one individual ritually deposited in room 23.

Fish are rare in the material under examination — only three fragments. Two of these belong to a bichir or a species that cannot be more closely determined (Polypterus sp. indet.), the third find cannot be determined. The bichir was caught in Egypt from the oldest period on for its tasty meat, and the fragments found are, without doubt, food remnants.

SOUHRN

V úvodu díla, které představuje další svazek série publikací Čs. egyptologického ústavu Karlovy univerzity v Praze o čs. výzkumu Ptahšepsesovy mastaby v Abusíru u Káhiry, je stručně zachycena historie výzkumu jednotlivých částí sekundárního pohřebiště, které využilo delší dobu po zániku prvotní zádušní funkce mastaby a prostor v jejím okolí.

1. kapitola popisuje nálezovou situaci pohřbů uvnitř mastaby. Nejčastěji byly umístěny do nejstarší části, tzv. prvotní mastaby. Ve většině případů nešlo o pohřby jednotlivců, porušené zásahy zlodějů a lamačů kamene, ale o úplně zpřeházené a pomíšené části skeletů většího počtu jedinců. V některých případech tvořily kosti velké hromady, působící dojmem naházení skeletizovaných pozůstatků, pohřbených původně na jiném, blíže neznámém místě. Mezi kostmi byly nalezeny rozptýlené zlomky dřeva, nejspíše z rakví, zbytky obalů zemřelých a drobné předměty skromného pohřebního inventáře. Ojedinělé lidské kostrové pozůstatky byly zjištěny v prostoru funerálních lodí a v prostoru jihovýchodních skladišť, kde leželo in situ i několik pohřbů jednotlivců.

2. kapitola obsahuje katalog pohřbů z prostoru kolem mastaby. Ze 115 pohřbů, nalezených in situ, bylo 58 uloženo v rakvích, 13 na prkně, 2 děti v keramických zásobnicích, jeden zemřelý na dřevěných tyčích a jeden zabalený do hrubé rohože. Bez ochrany přímo do písku bylo uloženo 37 zemřelých. Tři pohřby byly silně porušeny. Navíc byly v šesti hrobech vytříděny antropologické pozůstatky dalších osob, pocházejících asi z rozrušených pohřbů v okolí. V některých případech byli zemřelí ukládáni do výklenků nebo jam v cihlové ohradní zdi mastaby. Zvláštní hrobové stavby však nebyly budovány. Převládal ritus běžný v 1. tisíciletí př. n. l., tj. natažená poloha na zádech s hlavou k západu. Pohřební výbava byla chudá a týkala se pouze necelé čtvrtiny pohřbených osob.

3. kapitola je věnována katalogu a rozboru rakví. Celkem bylo nalezeno 58 rakví, všechny v prostoru mimo mastabu. Z toho byla jedna hliněná a 57 dřevěných, které lze typologicky rozčlenit na jednoduché dřevěné rakve bez výzdoby (8 exemplářů), jednoduché dřevěné rakve s obíleným povrchem (16), jednoduché dřevěné rakve s malovanou výzdobou (30) a dvojité rakve (3). Všechny rakve byly špatně zachované a rozpadly se brzy po odkrytí. Rakve byly velmi hrubě opracované. Převládaly rakve přibližně antropoidního tvaru (někdy zjednodušené až do podoby protáhlého nepravidelného šestiúhelníka) s obličejovou maskou a soklem. Výzdoba malovaných rakví byla konvenční, provedená řemeslně. Na 17 rakvích se zachovaly zbytky textu, obvykle běžných zádušních formulí. Nanejvýš u pěti rakví byl text individualizován vepsáním jména zemřelého. Rakve lze obecně datovat převážně do 6.—4. stol. př. n. l., některé z nich však mohly pocházet z mladších dob až do počátku 1. stol. n. l.

4. kapitola obsahuje katalog pohřebního inventáře, ke kterému patřily nejčastěji ozdobné předměty z fajánse a mušlí (korálky, amulety a závěsky), dále měděné (ojediněle stříbrné) ozdoby — náramky, prsteny a náušnice, kamenné a dřevěné předměty, zbytky obalů, rohoží a provázků, různé drobné předměty a nálezy keramiky, které mohly s pohřby souviset.

5. kapitola se zabývá xylotomickým rozborem zlomků dřeva z rakví a z pěti dalších předmětů. Nejčastěji byly zjištěny Ficus sycomorus a Acacia arabica, vzácněji Phoenix dactylifera, Cedrus libani, Zizyphus spina christi a blíže neurčitelné listnaté dřevo. Zjištěná frekvence je srovnána s frekvencí druhů dřeva v souboru staroegyptských rakví z čs. sbírek a pohřebiště 3.—6. stol. n. l. v Núbii.

6. kapitola se zabývá datováním pohřebiště. Tři radiouhlíková data (dvě z pohřbů kolem mastaby, jedno z depozitu kostí uvnitř mastaby) ukazují na rozmezí 7.—2. stol. př. n. l. Relativní datování fluoridovou metodou neprokázalo podstatný rozdíl mezi stářím pohřbů kolem a uvnitř mastaby. Byl však zjištěn větší obsah organické hmoty v kostech uvnitř mastaby a podstatně nižší v kostech mimo mastabu, což odpovídá rozdílům hmotnosti kostí z těchto obou částí pohřebiště (viz dále). Archeologické datování (podle rakví, keramiky a stratigrafie) určuje rozmezí od 7. stol. př. n. l. k 1. stol. n. l.

7. kapitola je věnována demografii, zpracované zvlášť pro obě části pohřebiště a souhrnně pro celý materiál. Uvnitř mastaby bylo pohřbeno na základě identifikace rozptýleného a zpřeházeného materiálu minimálně 176, maximálně 299 jedinců, v prostoru kolem mastaby 120 osob. Poměr nedospělých k dospělým byl uvnitř mastaby větší ve prospěch nedospělých, mimo mastabu větší ve prospěch dospělých, celkově vyrovnaný. Poměr dospělých mužů a žen ukázal uvnitř mastaby převahu mužů (kolem 60 %) nad ženami, naopak mimo mastabu mírný nad-

bytek žen (52,6 %), v celkovém souhrnu dominaci mužů (55,3 %) nad ženami. Průměrné stáří v době úmrtí bylo nápadně nízké, uvnitř mastaby 17,4 let, mimo mastabu 19,5 let. Dospělí muži žili o něco déle než ženy. U dětí nebyl nalezen obvyklý vysoký vrchol v prvním ročníku. Poměrná početnost materiálu umožnila konstrukci úmrtnostních tabulek.

8. kapitola rozebírá různé projevy pohřebního ritu s přihlédnutím k demografickým charakteristikám. Patří k nim ochrana pohřbů, manipulace s těly zemřelých, rituální poloha a orientace. Obvykle byli zemřelí položeni hlavou k západu s mírnými odchylkami k severu a jihu, pravděpodobně v závislosti na sezónních změnách východu slunce, k němuž směřovali obličeji.

9. kapitola je věnována rozboru 69 kraniometrických znaků a z nich odvozených 61 indexů. Srovnání statisticky významných rozdílů ukázalo na jedné straně pohlavní diferenciaci, na druhé straně shodnost série z vnitřku mastaby se sérií kolem mastaby, takže pro další zpracování posloužil spojený soubor z celého areálu. Jsou probírány rozměry a indexy mozkovny, obličejové části lebky, profilace obličeje a dolní čelisti. Srovnání hodnot abusírského souboru s chronologicky současným rozsáhlým souborem "E" z Gízy vykázalo u mužů pětinu a u žen dvě pětiny odlišných znaků. Několik rozměrů mohlo být srovnáno s recentními muži z Abusíru.

10. kapitola obsahuje rozbor 107 osteometrických znaků a z nich odvozených 48 indexů. Srovnání statisticky významných rozdílů ukázalo ještě výraznější pohlavní diferenciaci než u kraniometrických charakteristik, na druhé straně převážně podobnost sérií z obou částí mastaby. Výjimku představuje jen hmotnost, systematicky nižší u série z okolí mastaby než u série z vnitřku mastaby (viz výše). U spojeného souboru jsou probrány rozměry a indexy trupu, horní končetiny a dolní končetiny. Proporční indexy ukazují ve srovnání s těmiže indexy souboru 3.—5. stol. n. l. z Núbie europidní tendenci, ve srovnání s údaji předdynastického souboru z Naqady možnost sekulárních změn. Výška postavy byla rekonstruována dvěma odlišnými metodami a v každé jednak podle formulí pro bělochy, jednak pro černochy. Proporcím abusírského souboru vyhovují lépe černošské formule. Výšce postavy současných Abusířanů a okolní populace odpovídají nejlépe výsledky podle černošských tabulek TROTTEROVÉ a GLESEROVÉ (1952).

11. kapitola probírá kranioskopické znaky, zachycené verbálně nebo pomocí srovnávacích schémat zvlášť u obojího pohlaví a v pořadí jednotlivých lebních norem. Rozdílné frekvence potvrdily výrazný pohlavní rozdíl, konstatovaný u kraniometrických charakteristik. Epigenetických znaků bylo zachyceno 20, z toho 4 na obou stranách. Jejich frekvence byla u obojího pohlaví převážně podobná, ve více než třetině znaků odlišná. Naopak se frekvence znaků lišila v 70 % u dětí ve srovnání s dospělými. Kapitolu uzavírají další morfologická pozorování.

12. kapitola je věnována osteoskopickým znakům na trupu, horních končetinách a dolních končetinách. Až na několik výjimek byla i v nich zjištěna výrazná pohlavní diferenciace.

13. kapitola se zabývá růstem dětí a mládeže. Kraniometrických podkladů bylo k dispozici poměrně málo. Růstová tendence byla pozorována jen u části z nich, zatímco u jiných byl patrný příliš velký rozptyl individuálních hodnot. Délka diafýz dlouhých kostí končetin, rozměry součástí kyčelní kosti a rekonstruovaná výška postavy byly zachyceny u většího počtu případů, což umožnilo sestrojit regresní růstové křivky druhého stupně. Srovnání s obdobnými křivkami dětí z pohřebiště 3.—5. stol. n. l. v Núbii ukázalo, že abusírské děti rostly rychleji než núbijské.

14. kapitola probírá systematicky paleopatologické nálezy. Mezi nimi představoval významnou položku traumatismus, zjištěný u jedné pětiny dospělých jedinců, dvakrát častěji u mužů než u žen a nikdy u jedinců mladších 25 let. Převážná většina úrazů měla banální ráz a nebyla výsledkem bojových střetnutí. Ojedinělý doklad amputace distálního konce pravého předloktí dospělého muže rozmnožuje dva dosud známé případy. Méně často byly nalezeny zánětlivé změny. Naproti tomu byly v souboru běžné degenerativně-produktivní změny, zvláště spondylóza. Ve srovnání se souborem 3.—5. stol. n. l. z Núbie byla v Abusíru o něco méně intenzívní. Vzácněji se vyskytla spondylartróza, osteochondróza meziobratlových disků a artróza mimopáteřních kloubů, nejčastěji postihující temporomandibulární kloub. Byl nalezen jediný případ benigního nádoru. Cribra orbitalia byla zjištěna u dětí a mladistvých častěji než u dospělých. Obraz doplňují ojedinělé ortopedické změny, časté kongenitální anomálie a případy nemocí neznámé etiologie. Senilní změny byly pozorovány vzácně vzhledem k nepočetnému zastoupení starších jedinců. V závěru kapitoly jsou diskutovány pseudopatologické nálezy na lební konvexitě.

15. kapitola shrnuje různé aspekty studia chrupu. Zachycuje stav jeho zachovalosti, dále variace počtu, postavení a morfologie zubů, rychle postupující abrazi chrupu, poměrně malý výskyt zubního kazu a jeho následků a naopak relativně častý výskyt zubního kamene. Mimo rychlé tempo resorbce alveolární části docházelo vlivem ztráty zubů — abrazí, kazem nebo paradontózou — k její částečné nebo úplné atrofii. V erupci chrupu byly pozorovány archaické tendence.

16. kapitola seznamuje s výsledky histologického vyšetření několika vzorků organických tkání, které se vzácně v materiálu zachovaly. Vyschnutím tkání došlo k morfologickým změnám, přece však se zachovaly některé charakteristické struktury, umožňující identifikaci podle obdobných struktur recentních tkání. Ve vzorcích byla prokázána kůže, svalová tkáň, mozková tkáň, krevní cévy s červenými krvinkami a vlasy.

17. kapitola obsahuje archeozoologické zpracování zvířecích kostí, nalezených v mastabě. Ze savců domácně pěstovaných byl určen pes, osel, skot, ovce nebo koza, velbloud a vepř. Ze savců divoce žijících šlo o šakala a antilopu. Ptáci jsou zastoupeni výhradně vodními druhy (dva druhy volavek, čáp, ibis a neurčitelné zlomky), plazi krokodýlem a varanem. Vzácné zlomky ryb patří bichirovi. Většinou jde o potravní zbytky, jednak rituální, ve spojení s pohřby, jednak sídlištní. Rozbor doplňuje katalog archeozoologických nálezů u pohřbů i v ostatních prostorech mastaby.

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Tab. 5:1 Botanical Determination of Kinds of Wood of Coffins and Other Objects

Object	Sample no.	Tomb no. (Find no.)	Kind of wood
fragments of coffins	1	A2	Ficus sycomorus
	2	A6–9	Ficus sycomorus
	3	A15	Ficus sycomorus
	4	A18	Ficus sycomorus
	5	A36/12	Ficus sp.
	6	A40/B	Cedrus libani
	7	A40/B	Acacia sp.
	8	A44/1	Ficus sycomorus
	10	D130 a	Phoenix dactylifera
	11	I 287	Phoenix dactylifera
	12	XY3+	Acacia arabica
	13	XY 8+	Ficus sycomorus
	14	XY11+	Ficus sp.
	15	XY12+	Ficus sp.
	16	XY15+	Acacia sp. (?)
	17	XY16+	Acacia arabica
	19	J 1807	Ficus sycomorus
	24	I 375	Ficus sp.
	25	I 380/1	Ficus sp.
	26	I 383	Ficus sp.
	27	I 384	Acacia arabica
	28	I 386	Acacia arabica
	29	I 387	Acacia arabica
	30	I 400	Ficus sp.
	31	I 401	Acacia arabica
	32	I 407/1	Zizyphus spina christi
	33	I 466	Acacia arabica
	34	I 468	Acacia arabica
	35	J 1555	Acacia arabica
	36	J 1606	Ficus sp. (?)
	37	J 1628	Ficus sp.
	38	J1840	Ficus sp.
	39	J 1964	Acacia arabica
fragment of an undetermined wooden object	18	J 1616	Acacia sp.
fragments of a wooden stick	20	J 1606	Phoenix dactylifera
handle of a wooden box	21	A 42/1A	Cedrus libani
a wooden peg	22	J 1807	nearer undeterminable broad-leaf tree wood
fragment of an undetermined wooden object	23	J 1807	Cedrus libani

Explanation:

+ = wood of coffins from outside the Mastaba whose tomb numbers have not been preserved

Tab. 5:2 Comparison of Frequencies of Kinds of Wood Used for Coffins and other Objects

Botanical determination	1 Abusir		2 Egypt		3 Nubia		Total	
	n	%	n	%	n	%	n	%
Ficus (sycomorus)	17	51.5	20	62.5	12	25.5	59	48.4
Acacia (arabica)	12	36.4	2	6.3	24	51.1	38	31.1
Zizyphus (spina christi)	1	3.0	0	0.0	10	21.3	11	9.0
Phoenix dactylifera	2	6.1	4	12.5	0	0.0	6	4.9
Tamarix arcticulata (?)	0	0.0	4	21.5	1	2.1	5	4.1
Cedrus libani	1	3.0	2	6.2	0	0.0	3	2.5
Total	33	100.0	32	100.0	47	100.0	122	100.0

Explanations:

1 = coffins from the secondary cemetery in the Mastaba of Ptahshepses at Abusir
2 = Ancient Egyptian coffins from Czechoslovak Collections
3 = funeral beds and various objects of the X–Group cemeteries at Wadi Qitna and Kalabsha, Egyptian Nubia
n = number of cases % = percentage

Tab. 6:1 Results of Measurement of the Radiocarbon Activity of the Samples from Abusir

Laboratory no. of sample	Year of measure-ment	Locality and burial no.	Type of sample	Activity ^{14}C related to 0,95 activity of oxali cacid NBS %	Radiocarbon age with 1δ for $T_{1/2}$ = 5568±30 years B.P.	Radiocarbon age with 1δ for $T_{1/2}$ = 5730±40 years B.P.	Dendrochronologically corrected date of sample origin with 1δ according to: Damon et al. (1972)+ years B.C.	Dendrochronologically corrected date of sample origin with 1δ according to: Michael and Ralph (1972)+ years B.C.
1	2	3	4	5	6	7	8	9
CU 413	1983	Abusir J 1628	wood	74,54±2,07	2361±166	2431±171	515±171	458±166
CU 414	1983	Abusir J 1555	wood	77,27±1,97	2071±158	2133±163	166±165	140±163
CU 437	1983	Abusir A 15	linen	73,37±1,83	2488±147	2563±151	672±182	687±151
Means of the three samples	–	–	–	– –	2314±90	2388±92	463±100	420±100

Explanations: B.P. = before present (1950 A.D.)
+ = for $T_{1/2}$ = 5730±40 years

Table 6:2 Results of the Determination of Fluoride Ion Content, Density, Humidity and Loss by Ignition of Selected Bone Samples

1st Series								2nd Series							
Sample No.	Age	Sex	F−Content Mass %	Density g.cm^{-3}	Mass Decrease Mass % 110	180	550°C	Sample No.	Age	Sex	F− Content Mass %	Density g.cm^{-3}	Mass Decrease Mass % 110	180	550°C
A 17a	2–3	–	0,058±0,006	2,64	4,06	5,15	13,2	J 1892	±2	–	0,027±0,003	2,48	8,17	9,46	13,9
A 36/9b	10–11	–	0,046±0,002	2,47	5,37	6,16	15,3	J 1890	4–5	–	0,053±0,006	2,59	6,67	7,94	13,1
A 34	14–16	M	0,066±0,004	2,27	6,33	7,98	26,0	I 313	±9	–	0,054±0,001	2,51	7,84	9,48	17,1
A 44/1a	16–18	F	0,115±0,005	2,58	4,23	5,69	18,4	I 442	8–9	–	0,057±0,002	2,46	9,07	10,73	17,0
29b	25–30	M	0,107±0,002	2,72	4,03	4,83	12,5	I 420	9–10	–	0,064±0,002	2,46	8,67	10,21	15,0
A 36/12a	25–35	M	0,169±0,009	2,22	5,56	6,70	24,9	I 323	±16	M	0,104±0,018	2,52	8,43	10,07	16,2
A 6	30–40	M	0,117±0,012	2,12	6,82	8,53	33,7	I 444	28–32	M	0,095±0,002	2,65	6,16	8,14	12,6
D 135	30–40	F	0,196±0,011	2,47	7,66	9,09	15,8	J 1895	28–32	F	0,112±0,002	2,37	8,73	10,09	16,1
A 44/2a	35–45	M	0,145±0,010	2,10	6,53	8,15	32,4	J 1946	25–35	F	0,209±0,002	2,54	5,80	6,94	13,3
A 44/1b	40–50	M	0,140±0,005	2,14	6,48	8,32	32,0	I 445	20–50	F	0,147±0,010	2,60	5,95	6,97	12,3
A 1	45–55	M	0,201±0,004	2,19	7,01	8,52	32,4	J 1973	35–45	M	0,201±0,012	2,47	8,22	9,71	15,2
A 18	adult	M	0,213±0,007	2,49	5,32	6,98	17,2	I 448	35–45	F	0,227±0,014	2,51	7,04	8,47	14,6
A 14	adult	M	0,217±0,010	2,56	5,40	6,39	16,7	I 449	40–50	M	0,144±0,003	2,48	8,12	8,99	16,2
								I 324	40–50	F	0,077±0,007	2,59	7,87	9,58	18,0

Tab. 7:1 Demographic Data of the First Series (based on skulls and mandibles)

Number	Age	Sex	Number	Age	Sex	Number	Age	Sex
A 1	45–55	M	A 25c	0.75–1.0	–	A 36/4d	0–1	–
A 2a	0–0.5	–	A 26a	14–16	F	A 36/5	0–6	–
A 2b	2.0–2.5	–	A 26c	6–7	–	A 36/6a	30–50	M
A 3	25–30	F	A 26d	1.0–1.5	–	A 36/6b	7–8	–
A 4	6–7	–	A 26e	±2	–	A 36/6c	4–5	–
A 5	3–4	–	A 29a	30–40	M	A 36/6d	3–4	–
A 6	30–40	M	A 29b	25–30	M	A 36/6e	2–3	–
A 9	1.5–2.0	–	A 29c	25–30	F	A 36/6f	±0.5	–
A 10	25–30	M	A 29d	30–40	F	A 36/7a	25–35	F
A 11	6–7	–	A 29e	25–30	M	A 36/7b	40–50	M?
A 12	40–50	M	A 29f	25–35	M	A 36/7c	6–7	–
A 13	40–50	M	A 29j	30–40	F	A 36/7d	0–0.5	–
A 15a	16–18	M?	A 29k	±3	–	A 36/7e	±1	–
A 15b	20–40	M	A 29l	0.5–1.0	–	A 36/7f	2–3	–
A 16a	25–35	F	A 29m	±0.5	–	A 36/7g	2.5–3.0	–
A 16b	2–3	–	A 30a	35–45	M	A 36/7h	3–4	–
A 17a	2–3	–	A 30b	45–55	F	A 36/7i	4–5	–
A 17b	±0.5	–	A 31	20–40	F?	A 36/8a	5–6	–
A 18a	±3	–	A 33	25–35	F	A 36/8b	±1	–
A 18b	3–4	–	A 34	14–16	M	A 36/8c	0.25–0.5	–
A 19	30–40	M	A 35	7–8	–	A 36/8d	3–4	–
A 20a	7–8	–	A 36/1a	25–30	M	A 36/8e	2–3	–
A 20b	±1	–	A 36/1b	30–40	M	A 36/9a	35–45	F
A 21a	20–25	F	A 36/1c	20–30	F	A 36/9b	10–11	–
A 21b	6–7	–	A 36/1d	40–50	M	A 36/9c	5–6	–
A 21c	30–50	M	A 36/1e	2–3	–	A 36/9d	4–5	–
A 21d	30–50	F	A 36/2a	±2	–	A 36/9e	4–5	–
A 22a	±1	–	A 36/2b	0–0.5	–	A 36/9f	1.5–2.0	–
A 22b	±1	–	A 36/3a	±6	–	A 36/9g	30–40	M?
A 23a	25–30	M	A 36/3b	40–50	M	A 36/10a	4–5	–
A 23b	30–40	F	A 36/3c	3–4	–	A 36/10b	±0	–
A 23c	0–6	–	A 36/3d	25–35	F	A 36/11a	4–6	–
A 23d	30–40	M	A 36/3e	5–6	–	A 36/11b	±2	–
A 24	±1.5	–	A 36/4a	30–40	M	A 36/11c	±1.5	–
A 25a	20–30	M?	A 36/4b	25–30	F	A 36/12a	25–35	M
A 25b	±3	–	A 36/4c	20–40	M	A 36/12b	10–11	–
A 36/12c	±3	–	A 43/2	35–45	F	A 44/2k	±0.5	–
A 36/13	±1	–	A 43/3a	30–40	M	A 44/2l	25–30	F
A 37a	25–35	M	A 43/3b	25–30	F	A 44/3	30–40	F
A 37b	25–35	M	A 43/3c	6–7	–	A 45	25–30	M
A 38a	30–40	M	A 43/3d	±5	–	A 46a	25–30	M
A 38b	13–15	–	A 43/4	25–45	M	A 46b	3–4	–
A 38c	8–9	–	A 44/1a	16–18	F	A 46c	20–25	M
A 38d	5–6	–	A 44/1b	40–50	M	A 46d	25–30	M
A 38e	1–2	–	A 44/1c	40–50	M	A 46e	13–15	–
A 38f	±1	–	A 44/1d	3–4	–	A 46f	40–50	M?
A 39a	20–25	F	A 44/1e	5–6	–	A 46g	25–35	M?
A 39b	12–13	–	A 44/1f	25–45	M	A 46h	±3	–
A 39c	1.0–1.5	–	A 44/1g	30–50	F?	A 46i	±1	–
A 40a	30–40	F?	A 44/2a	35–45	M?	A 46j	0.25–0.5	–
A 40b	4–5	–	A 44/2b	25–30	F	A 48	18–20	F
A 41	11–12	–	A 44/2c	25–30	M	A 49	40–50	F
A 42a	25–35	F	A 44/2d	30–40	M			
A 42b	20–25	M	A 44/2e	25–30	M	D 84	20–40	F?
A 42c	13–15	–	A 44/2f	±6	–	D 123	20–25	M
A 42d	1.5–2.0	–	A 44/2g	±6	–	D 125	20–22	F
A 42e	1.0–1.5	–	A 44/2h	2–3	–	D 130a	28–32	M
A 42f	25–35	M	A 44/2i	1.0–1.5	–	D 130b	±6	–
A 43/l	40–50	M	A 44/2j	0.5–1.0	–	D 135	30–40	F

Explanations: M = male, F = female

Tab. 7:2 Demographic Data of the Second Series (based on whole skeletons)

Number	Age	Sex	Number	Age	Sex	Number	Age	Sex
I 273	18—22	F	I 411	23—27	M	J 1606	25—30	M
I 287	30—40	F	I 412	20—21	F	J 1628	28—32	M
I 293	23—27	M	I 413	11—12	—	J 1639	20—40	F
I 294/1	28—32	F	I 414	30—35	M	J 1744	40—50	F
I 294/2	23—27	M	I 415	40—50	M	J 1761	40—50	M
I 304	20—21	M	I 417	13—15	—	J 1807	30—40	F
I 305	±2.5	—	I 418	40—50	M	J 1840	28—32	M
I 313	±9	—	I 420	9—10	—	J 1885	±4	—
I 316	±1	—	I 421	0.5—1.0	—	J 1889	30—50	F
I 317	28—32	M	I 439	±8	—	J 1890	4—5	—
I 323	±16	M	I 441	±5	—	J 1891	30—40	F
I 324	40—50	F	I 442	8—9	—	J 1892	±2	—
I 325	±3	—	I 444	28—32	M	J 1894	30—40	M
I 326	0.5—0.75	—	I 445	20—50	F?	J 1895	28—32	F
I 327	2.0—2.5	—	I 446	±3	—	J 1896	19—20	F
I 335	25—30	F	I 447	30—40	F	J 1946	25—30	F
I 337	20—21	M	I 448	35—45	F	J 1947	20—25	M
I 374/1	0.5—0.75	—	I 449	40—50	M	J 1949	28—32	M
I 374/2	2—3	—	I 452	40—50	M	J 1950	18—19	F
I 375	25—30	M	I 453	2—3	—	J 1958	30—40	F
I 379	±7	—	I 454	30—50	M	J 1960	50—60	F
I 380/1	40—50	F	I 455	0.5—0.75	—	J 1961	30—35	F
I 380/2	±2	—	I 456	25—30	F	J 1963	1.0—1.5	—
I 381	±9	—	I 457	30—35	M	J 1964	23—27	F
I 382/1	±5	—	I 459	0.25—0.5	—	J 1965	25—30	M
I 382/2	40—50	F	I 460	23—27	F	J 1966	5—6	—
I 383	30—40	F	I 461	25—30	F	J 1967	30—40	F
I 384	23—27	F	I 462	±6	—	J 1970	23—27	F
I 386	40—50	M	I 464	3—4	—	J 1971	40—50	F
I 387	3—4	—	I 465	±4	—	J 1973	35—45	M
I 390	±4	—	I 466	25—30	M	J 1974	4—5	—
I 393	28—32	M	I 467	7—8	—	J 1975	30—35	F
I 395	35—45	M	I 468	1.5—2.0	—	J 1976	40—50	M
I 397	3—4	—	I 469	40—50	F			
I 400	±6	—	I 470	0.5—1.0	—	D 226a	30—50	F
I 401	40—50	F				D 226b	20—30	F
I 403	13—14	—	J 394	0.25—0.5	—	D 226c	3—4	—
I 405	19—20	F	J 542	35—45	M	D 230a	30—40	M
I 406	30—50	F	J 1483	40—50	M	D 230b	±3	—
I 407/1	±19	M	J 1553	±7	—	D 334	30—40	M
I 407/2	25—30	M	J 1555	30—40	F			

Explanations: M = male, F = female

Tab. 7:3 Number of Preserved Bones of the First Series and their Age and Sex Distribution

Age and sex group	Skull and mandible		Clavicle		Humerus		Radius		Ulna		Pelvis		Femur		Tibia		Fibula	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Children (0—14.9 yrs.)	93	52.8	30	36.6	73	51.4	43	39.1	46	47.9	90	56.3	94	53.7	74	50.3	27	33.8
Juveniles (15—19.9 yrs.)	50	2.8	1	1.2	1	0.7	1	0.9	2	2.1	3	1.9	—	0.0	2	1.4	2	2.5
Adults (20—x yrs.)	78	44.3	51	62.2	68	47.9	66	60.0	48	50.0	67	41.9	81	46.3	71	48.3	51	63.8
Total	176	99.9	82	100.0	142	100.0	110	100.0	96	100.0	160	100.1	175	100.0	147	100.0	80	100.1
Males (20—x yrs.)	50	64.1	25	49.0	39	57.4	36	54.5	29	60.4	40	59.7	51	63.0	44	62.0	28	54.9
Females (20—x yrs.)	28	35.9	26	51.0	29	42.6	30	45.5	19	39.6	27	40.3	30	37.0	27	38.0	23	45.1

Tab. 7:4 Comparison of the Age and Sex Distribution of the Maximum and Minimum Numbers of Individuals of the First Series

Age and sex group	Maximum number (structurally assessed)		Minimum number (skulls and mandibles)	
	n	%	n	%
Children (0—14.9 yrs.)	156	52.2	93	52.8
Juveniles (15—19.9 yrs.)	10	3.3	5	2.8
Adults (20-x yrs.)	133	44.5	78	44.3
Total	299	100.0	176	99.9
Males (15-x yrs.)	81	60.9	52	62.7
Females (15-x yrs.)	52	39.1	31	37.3

Tab. 7:5 Comparison of the Age and Sex Distribution of the First and Second Series

Age and sex group	First series+ n	%	Second series n	%	Both series combined n	%
Children (0—14.9 yrs.)	93	52.8	44	36.7	137	46.3
Juveniles (15—19.9 yrs.)	5	2.8	5	4.2	10	3.4
Adults (20-x yrs.)	78	44.3	71	59.2	149	50.3
Total	176	99.9	120	100.1	296	100.0
Males (15-x yrs.)	52	62.7	36	47.4	88	55.3
Females (15-x yrs.)	31	37.3	40	52.6	71	44.7

Explanation:
+ = in this and following tables this series is represented by its minimum number according to skulls and mandibles

Tab. 7:6 Mean Age at Death (years)

Age and sex group	First series	Second series	Both series combined
Children (0—14.9 yrs.)	3.8	4.5	4.0
Males (15-x yrs.)	33.6	32.8	33.3
Females (15-x yrs.)	30.9	33.3	32.3
Total	17.4	22.6	19.5

Tab. 7:7 Survey of the Age Determination of Children

Age determination (yrs.)	First series nos.	n	Second series nos.	n
±0	A 36/10b	1	—	—
0—0.5	A 2a, A 36/2b, A 36/7d	3	—	—
0.25—0.5	A 36/8c, A 46j	2	I 459, J 394	2
±0.5	A 17b, A 29m, A 36/6f, A 44/2k	4	—	—
0—1	A 36/4d	1	—	—
0.5—0.75	—	—	I 326, I 374/1, I 455	3
0.5—1.0	A 29l, A 44/2j	2	I 421, I 470	2
0.75—1.0	A 25c	1	—	—
±1	A 20b, A 22a, A 22b, A 36/7e, A 36/8b, A 36/13, A 38f, A 46i	8	I 316	1
1.0—1.5	A 26d, A 39c, A 42e, A 44/2i	4	J 1963	1
±1.5	A 24, A 36/11c	2	—	—
1—2	A 38e	1	—	—
1.5—2.0	A 9, A 36/9f, A 42d	3	I 468	1
±2	A 26e, A 36/2a, A 36/11b	3	I 380/2, J 1892	2
2.0—2.5	A 2b	1	I 327	1
±2.5	—	—	I 305	1
2—3	A 16b, A 17a, A 36/1e, A 36/6e, A 36/7f, A 36/8e, A 44/2h	7	I 374/2, I 453	2
2.5—3.0	A 36/7g	1	—	—
±3	A 18a, A 25b, A 29k, A 36/12c, A 46h	5	I 325, I 446, D 230b	3
0—6	A 23c, A 36/5	2	—	—
3—4	A 5, A 18b, A 36/3c, A 36/6d, A 36/7h, A 36/8d, A 44/1d, A 46b	8	I 387, I 397, I 464, D 226c	4
±4	—	—	I 390, I 465, I 1885	3
4—5	A 36/6c, A 36/7i, A 36/9d, A 36/9e, A 36/10a, A 40b	6	J 1890, J 1974	2
±5	A 43/3d	1	I 382/1, I 441	2
4—6	A 36/11a	1	—	—
5—6	A 36/3e, A 36/8a, A 36/9c, A 38d, A 44/1e	5	J 1966	1
±6	A 36/3a, A 44/2f, A 44/2g, D 130b	4	I 400, I 462	2
6—7	A 4, A 11, A 21b, A 26c, A 36/7c, A 43/3c	6	—	—
±7	—	—	I 379, J 1553	2
7—8	A 20a, A 35, A 36/6b	3	I 467	1

Age determination (yrs.)	First series nos.	n	Second series nos.	n
±8	–	–	I 439	1
8–9	A 38c	1	I 442	1
±9	–	–	I 313, I 381	2
9–10	–	–	I 420	1
10–11	A 36/9b, A 36/12b	2	–	–
11–12	A 41	1	I 413	1
12–13	A 39b	1	–	–
13–14	–	–	I 403	1
13–15	A 38b, A 42c, A 42c, A 46e	3	I 417	1

Tab. 7:8 Survey of the Age Determination of Juveniles and Adults

Age determination (yrs.)	First series				Second series			
	Males		Females		Males		Females	
	nos.	n	nos.	n	nos.	n	nos.	n
14–16	A 34	1	A 26a	1	–	–	–	–
±16	–	–	–	–	I 323	1	–	–
16–18	A 15a	1	A 44/1a	1	–	–	–	–
18–19	–	–	–	–	–	–	J 1950	1
±19	–	–	–	–	I 407/1	1	–	–
18–20	–	–	A 48	1	–	–	–	–
19–20	–	–	–	–	–	–	I 405, J 1896	2
18–22	–	–	–	–	–	–	I 273	1
20–21	–	–	–	–	I 304, I 337	2	I 412	1
20–22	–	–	D 125	1	–	–	–	–
20–25	A 46c, D 123	2	A 21a, A 39a	2	J 1947	1	–	–
23–27	–	–	–	–	I 293, I 294/2, I 411	3	I 384, I 460, J 1964, J 1970	4
20–30	A 25a	1	A 36/1c	1	–	–	D 226b	1
25–30	A 10, A 23a, A 29b, A 29e, A 36/1a, A 42b, A 44/2c, A 44/2e, A 45, A 46a, A 46d	11	A 3, A 29c, A 36/4b, A 43/3b, A 44/2b, A 44/2l	6	I 375, I 407/2, I 466, J 1606, J 1965	5	I 355, I 456, I 461, J 1946	4
28–32	D 130a	1	–	–	I 317, I 393, I 444, J 1628, J 1840, J 1949	6	I 294/1, J 1895	2
25–35	A 29f, A 36/12a, A 37a, A 37b, A 42f, A 46g	6	A 16a, A 33, A 36/3d, A 36/7a, A 42a	5	–	–	–	–
20–40	A 15b, A 36/4c	2	A 31, D 84	2	–	–	J 1639	1
30–35	–	–	–	–	I 414, I 457	2	J 1961, J 1975	2
30–40	A 6, A 19, A 23d, A 29a, A 36/1b, A 36/4a, A 36/9g, A 38a, A 43/3a, A 44/2d	10	A 23b, A 29d, A 29j, A 40a, A 44/3, D 135	6	J 1894, D 230a, D 334	3	I 287, I 383, I 447, J 1555, J 1807, J 1891, J 1958, J 1967	8
25–45	A 43/4, A 44/1f	2	–	–	–	–	–	–
20–50	–	–	–	–	–	–	I 445	1
35–45	A 30a, A 44/2a	2	A 36/9a, A 43/2	2	I 395, J 542, J 1973	3	I 448	1
30–50	A 21c, A 36/6a	2	A 21d, A 44/1g	2	I 454	1	I 406, J 1889 226a	3
40–50	A 12, A 13, A 36/1d, A 36/3b, A 36/7b, A 43/1, A 44/1b, A 44/1c, A 46f	10	A 49	1	I 386, I 415, I 418, I 449, I 452, J 1483, J 1761, J 1976	8	I 324, I 380/1, I 382/2, I 401, I 469, J 1744, J 1971	7
45–55	A 1	1	A 30b	1	–	–	–	–
50–60	–	–	–	–	–	–	J 1960	1

Tab. 7:9 Detailed Age Group Distribution of Children

Age group (yrs.)	First series n	%	Second series n	%	Both series comined n	%[1]	%[2]
0—0.9	14	15.1	7	15.9	21	15.3	7.1
1—1.9	18	19.4	3	6.8	21	15.3	7.1
2—2.9	12	12.9	6	13.6	18	13.1	6.1
3—3.9	15	16.1	7	15.9	22	16.1	7.4
4—4.9	6	6.5	5	11.4	11	8.0	3.7
5—5.9	7	7.5	3	6.8	10	7.3	3.4
6—6.9	10	10.8	2	4.5	12	8.8	4.1
7—7.9	3	3.2	3	6.8	6	4.4	2.0
8—8.9	1	1.1	2	4.5	3	2.2	1.0
9—9.9	—	—	3	6.8	3	2.2	1.0
10—10.9	2	2.2	—	—	2	1.5	0.7
11—11.9	1	1.1	1	2.3	2	1.5	0.7
12—12.9	1	1.1	—	—	1	0.7	0.3
13—13.9	—	—	1	2.3	1	0.7	0.3
14—14.9	3	3.2	1	2.3	4	2.9	1.4
Total	93	100.2	44	100.2	137	100.0	46.3

Explanations:
%[1] = per cent from the total number of children (137)
%[2] = per cent from the total number of all individuals (296)

Tab. 7:10 Detailed Age Group Distribution of Juveniles and Adults

Age group (yrs.)	First series				Second series				Both series combined								
	Males		Females		Males		Females		Males			Females			Both sexes		
	n	%	n	%	n	%	n	%	n	%	%[4]	n	%[2]	%[4]	n	%[3]	%[4]
15—19.9	2	3.8	3	9.7	2	5.6	3	7.5	4	4.5	1.4	6	8.5	2.0	10	6.3	3.4
20—24.9	2	3.8	3	9.7	3	8.3	2	5.0	5	5.7	1.7	5	7.0	1.7	10	6.3	3.4
25—29.9	12	23.1	6	19.4	8	22.2	9	22.5	20	22.7	6.8	15	21.1	5.1	35	22.0	11.8
30—29.9	21	40.4	13	41.9	11	30.6	14	35.0	32	36.4	10.8	27	38.0	9.1	59	37.1	19.9
40—49.9	14	26.9	5	16.1	12	33.3	11	27.5	26	29.5	8.8	16	22.5	5.4	42	26.4	14.2
50—59.9	1	1.9	1	3.2	—	—	1	2.5	1	1.1	0.3	2	2.8	0.7	3	1.9	1.0
Total	52	99.9	31	100.0	36	100.0	40	100.0	88	99.9	29.8	71	99.9	24.0	159	100.0	53.7

%[1] = per cent from the total number of males (88)
%[2] = per cent from the total number of females (71)
%[3] = per cent from the total number of juveniles and adults (159)
%[4] = per cent from the total number of all individuals (296)

Tab. 7:11 Life Table according to the First Series

Age group (yrs.)	D_X	d_X	1_X	q_X	L_X	T_X	e^0_X
0—0.9	14	8.0	100.0	8.0	96.0	1839.5	18.4
1—4.9	51	29.0	92.0	31.5	77.5	1743.5	19.0
5—9.9	21	11.9	63.0	18.9	57.1	1433.6	22.8
10—14.9	7	4.0	51.1	7.8	49.1	1148.0	22.5
15—19.9	5	2.8	47.1	5.9	45.7	902.5	19.2
20—29.9	23	13.1	44.3	29.6	37.8	665.0	15.0
30—39.9	34	19.3	31.2	61.9	21.6	287.0	9.2
40—49.9	19	10.8	11.9	90.8	6.5	71.0	6.0
50—59.9	2	1.1	1.1	100.0	0.6	6.0	5.5

Explanations for Tables 7:11—7:15
D_X = number of deaths
d_X = percentage of deaths
1_X = survivors entering
q_X = probability of death
L_X = total years lived between X and X + 0.9 (3.9, 4.9, 9.9 ...)
T_X = total years lived after lifetime
e^0_X = life expectancy

Tab. 7:12 Life Table according to the Second Series

Age group (yrs.)	D_x	d_x	1_x	q_x	L_x	T_x	e^0_x
0—0.9	7	5.8	100.0	5.8	97.1	2340.6	23.4
1—4.9	21	17.5	94.2	18.6	85.5	2243.5	23.8
5—9.9	13	10.8	76.7	14.1	71.3	1901.5	24.8
10—14.9	3	2.5	65.9	3.8	64.7	1545.0	23.4
15—19.9	5	4.2	63.4	6.6	61.3	1221.5	19.3
20—29.9	22	18.3	59.2	30.9	50.1	915.0	15.5
30—39.9	25	20.8	40.9	50.9	30.5	414.0	10.1
40—49.9	23	19.2	20.1	95.5	10.5	109.0	5.4
50—59.9	1	0.8	0.8	100.0	0.4	4.0	5.0

Tab. 7:13 Life Table according to Both Series Combined

Age group (yrs.)	D_x	d_x	1_x	q_x	L_x	T_x	e^0_x
0—0.9	21	7.1	100.0	7.1	96.5	2036.2	20.4
1—4.9	72	24.3	92.9	26.2	80.8	1939.7	20.9
5—9.9	34	11.5	68.6	16.8	62.9	1616.5	23.6
10—14.9	10	3.4	57.1	6.0	55.4	1302.0	22.8
15—19.9	10	3.4	53.7	6.3	52.0	1025.0	19.1
20—29.9	45	15.2	50.3	30.2	42.7	765.0	15.2
30—39.9	59	19.9	35.1	56.7	25.2	338.0	9.6
40—49.9	42	14.2	15.2	93.4	8.1	86.0	5.7
50—59.9	3	1.0	1.0	100.0	0.5	5.0	5.0

Tab. 7:14 Life Table for Males of the Both Combined Series

Age group (yrs.)	D_x	d_x	1_x	q_x	L_x	T_x	e^0_x
0—0.9	11+	6.9	100.0	6.9	96.6	2110.4	21.1
1—4.9	37.8+	23.8	93.1	25.6	81.2	2013.8	21.6
5—9.9	17++	10.7	69.3	15.4	64.0	1689.0	24.4
10—14.9	5++	3.2	58.6	5.5	57.0	1369.0	23.4
15—19.9	4	2.5	55.4	4.5	54.2	1084.0	19.6
20—29.9	25	15.7	52.9	29.7	45.1	813.0	15.4
30—39.9	32	20.2	37.2	54.3	27.1	362.0	9.7
40—49.9	26	16.4	17.0	96.5	8.8	91.0	5.4
50—59.9	1	0.6	0.6	100.0	0.3	3.0	5.0

Explanations to tabs. 7:14—7:15
+ = divided into males and females in relation of 52.5:47.5
++ = divided into males and females in relation of 50:50

Tab. 7:15 Life Table for Females of the Both Combined Series

Age group (yrs.)	D_x	d_x	1_x	q_x	L_x	T_x	e^0_x
0—0.9	10+	7.3	100.0	7.3	96.4	1952.6	19.5
1—4.9	34.2+	24.9	92.7	26.9	80.3	1856.2	20.0
5—9.9	17++	12.4	67.8	18.3	61.6	1535.0	22.6
10—14.9	5++	3.6	55.4	6.5	53.6	1227.0	22.1
15—19.9	6	4.4	51.8	8.5	49.6	959.0	18.5
20—29.9	20	14.6	47.4	30.8	40.1	711.0	15.0
30—39.9	27	19.7	32.8	60.1	23.0	310.0	9.5
40—49.9	16	11.7	13.1	89.3	7.3	80.0	6.1
50—59.9	2	1.4	1.4	100.0	0.7	7.0	5.0

Tab. 8:1 Protection of the Burials in the Cemetery around the Mastaba

Burial lying	Males (n = 36)		Females (n = 41)§		Children+ (n = 44)		Total (n = 121)§	
	n	%	n	%	n	%	n	%
– in a coffin	19	55.9	26	70.3	11	26.2	56	49.6
– on plant stalks in a coffin	2	5.9	–	0.0	–	0.0	2	1.8
– on a plank	2	5.9	5	13.5	6	14.3	13	11.5
– in a pit in a mud brick wall or destruction	3	8.8	2	5.4	8	19.0	13	11.5
– on plant stalks in a pit in a mud brick wall or destruction	–	0.0	–	0.0	1	2.4	1	0.9
– protected by stone blocks	1	2.9	–	0.0	1	2.4	2	1.8
– in a storage jar	–	0.0	–	0.0	2	4.8	2	1.8
– loosely in sand-and-limestone-chip layer	7	20.6	3	8.1	11++	26.2	21	18.6
– on plant stalks in sand-and-lime-stone-chip layer	–	0.0	–	0.0	1	2.4	1	0.9
– in a mat in sand-and-limestone-chip layer	–	0.0	–	0.0	1	2.4	1	0.9
– in linen in sand-and-imestone-chip layer	–	0.0	1	2.7	–	0.0	1	0.9
Total	34	100.0	37	100.0	42	100.1	113	100.2
Fragmentary and destroyed burials+++	2	–	4	–	2	–	8	–

Explanations:
§ = including one burial (D 335), from which anthropological material was not unearthed
\+ = up till 14 years
++ = once in the filling of an older tomb
+++ = one more not sexed burial (J 354) not included
n = number of cases
% = percentage

Tab. 8:2 Ritual Position of the Burials in the Cemetery around the Mastaba

Position of	Males (n = 36)		Females (n = 41)§		Children+ (n = 44)		Total (n = 121)§	
	n	%	n	%	n	%	n	%
– body: (1) stretched on back	26	92.9	33	100.0	37	94.9	96	96.0
(2) stretched on left side	2	7.1	–	0.0	–	0.0	2	2.0
(3) flexed on left side	–	0.0	–	0.0	1	2.6	1	1.0
(4) flexed on righ side	–	0.0	–	0.0	1	2.6	1	1.0
Total	28	100.0	33	100.0	39	100.1	100	100.0
Fragmentary and disturbed burials+++	8	–	8	–	5	–	21	–
– arms: (1) forearm over pelvis, hands in lap	17	65.4	16	55.2	19	59.4	52	59.8
(2) alongside body, hands on lateral aspects of thigh	6	23.1	10	34.5	10	31.3	26	29.9
(3) L (1), R (2)	2	7.7	2	6.9	–	0.0	4	4.6
(4) L (2), R (1)	–	0.0	–	0.0	1	3.1	1	1.1
(5) L flexed in elbow, forearm and hand on chest, R (2)	–	0.0	–	0.0	1	3.1	1	1.1
(6) L (2), R flexed in elbow, forearm over pelvis, hand on left side of pelvis	–	0.0	1	3.4	–	0.0	1	1.1
(7) flexed in elbow, hand L under chest, R above	–	0.0	–	0.0	1	3.1	1	1.1
(8) L flexed in elbow, hand under pelvis, R (1)	1	3.8	–	0.0	–	0.0	1	1.1
Total	26	100.0	29	100.0	32	100.0	87	99.8
Fragmentary and disturbed burials+++	10	–	12	–	12	–	34	–

Explanations: see Tab. 8:1

Tab. 8:3 Orientation of the Burials around the Mastaba in Relation to the Demographic Data+

Age and sex group	W			SWW			NWW			SW			NW			S			N			E++			Sum	Undeterminable	
	nos.	n	%	nos.	n	%	nos.	n	%	nos.	n	%	nos.	n	%	nos.	n	%	nos.	n	%	nos.	n	%	n	nos.	n
Children (0—14.9 yrs.)	I 313, I 374/1 (?), I 374/2, I 381, I 382/1, I 417, I 421, I 453, I 459, I 462, I 464, I 467, I 470, J 1553, J 1885, J 1892, J 1963, J 1974	18	45.0	I 305, I 379, I 390, I 446, J 1890	5	12.5	I 403, I 413, I 420, I 439, I 455, I 465, I 468, J 1966	8	20.0	I 325, I 327, I 387	3	7.5	I 397	1	2.5	I 316, I 326, I 400	3	7.5	—	—	0.0	I 441, I 442	2	5.0	40	I 380/2, J 394, D 226 c, D 230 b	4
Males (15-x yrs.)	I 293, I 317, I 323, I 337, I 375, I 393, I 407/1, I 414, I 444, I 449, I 452, I 454 (?), I 457, J 542, J 1761, J 1840 (?), J 1894, J 1965, D 230 a, D 334	20	58.8	I 466, J 1949	2	5.9	I 415, I 418, J 1973, J 1976	4	11.8	J 1483	1	2.9	I 395	1	2.9	I 304, J 1947	2	5.9	I 386, J 1606	2	5.9	I 411, J 1628	2	5.9	34	I 294/2, I 407/2	2
Females (15-x yrs.)	I 294/1, I 324, I 335, I 380/1, I 383, I 384, I 406, I 447, I 456, I 461, I 469, J 1807, J 1889, J 1891, J 1895, J 1896, J 1950, J 1958, J 1960, J 1961, J 1964, J 1967, J 1971, D 335	24	63.2	I 287, J 1946, J 1970	3	7.9	I 273, I 401. I 412, I 448, J 1975	5	13.2	—	—	0.0	I 405, I 460	2	5.3	J 1555 (?), J 1639 (?), J 1744	3	7.9	I 445	1	2.6	—	—	0.0	38	I 382/2, D 226 a, D 226 b	3
Adults and juveniles (15-x yrs.)	—	44	61.1	—	5	6.9	—	9	12.5	—	1	1.4	—	3	4.2	—	5	6.9	—	3	4.2	—	2	2.8	72	—	5
Total	—	62	55.4	—	10	8.9	—	17	15.2	—	4	3.6	—	4	3.6	—	8	7.1	—	3	2.7	—	4	3.6	112	—	9

Explanations:
+ = The orientation refers to heads of the burials
++ = including SEE (one case)
n = number of cases
% = percentage

Tab. 8:4 Probably Seasonally Determined Orientation of Burials+ in Relation to Demographic Data

Age and sex group	Spring and autumn types (11°S–11°N)++ nos.	n	%	Summer type (12°S–40°S)++ nos.	n	%	Winter type (12°N–40°N)++ nos.	n	%	Sum n	Other directions nos.	n	Undeterminable nos.	n
Children (0–14.9 yrs.)	I 374/1, I 374/2, I 381, I 382/1, I 417, I 421, I 453, I 459, I 462, I 464, I 467, I 470, J 1963, J 1974	14	51.9	I 379, I 387, I 390, I 446	4	14.8	I 397, I 403, I 413, I 420, I 439, I 455, I 465, I 468, J 1966	9	33.3	27	I 400, I 441, I 442	3	I 380/2	1
Males (15-x yrs.)	I 375, I 393, I 407/1, I 414, I 444, I 449, I 452, I 454 (?), I 457, J 1965	10	58.8	I 466, J 1949	2	11.8	I 395, I 415, I 418, J 1973, J 1976	5	29.4	17	I 386, I 411, J 1947	3	I 407/2	1
Females (15-x yrs.)	I 380/1, I 383, I 384, I 406, I 447, I 456, I 461, I 469, J 1950, J 1958, J 1960, J 1961, J 1967, J 1971	14	63.6	J 1964, J 1970	2	9.1	I 401, I 405, I 412, I 448, I 460 J 1975	6	27.3	22	I 445	1	I 382/2	1
All adults		24	61.5		4	10.3		11	28.2	39		4		2
Total		38	57.6		8	12.1		20	30.3	66		7		3

Explanations:
+ = from excavation season 1974 only
++ = deviations from the W orientation towards S and N
n = number of cases
% = percentage

Tab. 9:1 Survey of the Frequency of Significant F- and t-tests in Skull Measurements and Indices

Comparison	Test	Cerebral skull m. /N=24/ n	%	Cerebral skull i. /N=29/ n	%	Facial skull m. /N=17/ n	%	Facial skull i. /N=18/ n	%	Profilation m. /N=16/ n	%	Profilation i. /N=5/ n	%	Mandibular m. /N=12/ n	%	Mandibular i. /N=9/ n	%	All measurements /N=69/ n	%	All indices /N=61/ n	%	Total /N=130/ n	%
	F	3	12.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	8.3	0	0.0	4	5.8	0	0.0	4	3.1
M_1:F_1	t	3	12.5	4	13.8	4	23.5	2	11.1	0	0.0	0	0.0	7	58.3	2	22.2	14	20.3	8	13.1	22	16.9
	F	0	0.0	2	6.9	0	0.0	0	0.0	0	0.0	1	20.0	0	0.0	1	11.1	0	0.0	4	6.6	4	3.1
M_2:F_2	t	10	41.7	8	27.6	4	23.5	3	16.7	1	7.1	0	0.0	3	25.0	2	22.2	18	26.1	13	21.3	31	23.8
	F	0	0.0	0	0.0	2	11.8	0	0.0	1	7.1	0	0.0	0	0.0	0	0.0	3	4.3	0	0.0	3	2.3
M_1:M_2	t	0	0.0	0	0.0	1	5.9	2	11.1	0	0.0	0	0.0	0	0.0	0	0.0	1	1.4	2	3.3	3	2.3
	F	2	8.3	0	0.0	0	0.0	1	5.6	0	0.0	0	0.0	1	8.3	0	0.0	2	2.9	2	3.3	4	3.1
F_1:F_2	t	1	4.2	1	3.4	1	5.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	2.9	1	1.6	3	2.3

Explanations:
m. = measurements
i. = indices
N = number of measurements or indices
n = number of significantly different measurements or indices
% = percentage of significantly different measurements or indices
M_1 = males, first series
M_2 = males, second series
F_1 = females, first series
F_2 = females, second series
Significance at the 0.05 % level

Tab. 9:2 Cranial Measurements and Indices Differing Significantly between Both Series

No.	Measurement/Index	First series n	$\bar{x}$	m	s	min.	max.	Second series n	$\bar{x}$	m	s	min.	max.	Test F	t
		Males						Males							
44	Biorbital breadth	12	97.25	0.92	3.19	92	103	11	94.64	0.83	2.77	91	98	–	+
48	Upper facial height	11	70.55	0.69	2.30	67	74	8	68.25	1.84	5.20	58	75	+	–
55	Nasal height	12	50.58	0.60	2.07	48	55	10	51.00	1.28	4.06	43	58	+	–
38	Facial i. by Kollmann /47:45/	3	92.33	2.39	4.14	87.9	96.1	4	81.72	1.57	3.14	78.9	86.2	–	+
39.1	Upper fac. i. by Virchow /48:46'/	11	74.06	1.11	3.68	66.3	80.7	8	70.38	1.22	3.46	64.4	74.5	–	+
TI	Depth of incisura maxillaris[1]	8	7.19	0.19	0.53	6.5	8.0	9	7.33	0.41	1.22	5.0	9.0	+	–
		Females						Females							
5	Length of skull base	4	95.00	0.41	0.82	94	96	15	95.13	1.20	4.66	87	104	+	–
10	Maximum frontal breadth	8	112.62	0.91	2.56	109	117	25	112.80	1.29	6.47	103	131	+	–
31	Occipital chord	6	100.67	2.60	6.35	91	110	25	96.00	0.74	3.71	89	105	–	+
115	Transv. i. of skull vault /11:24/	7	37.99	0.64	1.71	35.6	41.0	20	39.90	0.30	1.36	36.5	41.5	–	++
48.1	Maxilloalveolar height	9	19.78	0.83	2.49	16	22	24	18.08	0.37	1.82	14	21	–	+
147	Vertic. cranio-facial i. /48:17/	5	51.18	2.19	4.91	47.4	58.3	9	53.39	0.58	1.74	50.8	56.0	+	–
68.1	Mandibular length	16	100.62	0.71	2.85	95	105	25	99.24	0.95	4.76	87	108	+	–

Explanations:
no. = number of measurement according to Martin and Saller /1957/, symbol of measurement or number of index according to present author
n = number of cases
$\bar{x}$ = arithmetic mean
m = standart error of the mean
s = standart deviation
min. = minimum value of the range
max. = maximum value of the range
[1] = measured perpendicularly to breadth of incisura maxillaris /= breadth from the point zygomaxillare to the point laterally of the socket of M_1/
+ = significance at the 0.05% level (also in the following tables)
++ = significance at the 0.01% level (also in the following tables)

Tab. 9:3 Measurements and Indices of the Cerebral Skull

No.	Measurement/Index	Males							Females							Test	
		n	$\bar{x}$	m	s	V	min.	max.	n	$\bar{x}$	m	s	V	min.	max.	F	t
1	Maximum length of skull	32	184.63	0.89	5.03	2.72	171.00	192.00	35	176.31	0.91	5.40	3.06	163.00	186.00		++
5	Length of skull base	25	102.52	0.85	4.24	4.14	93.00	109.00	19	95.11	0.95	4.12	4.33	87.00	104.00		
7	Length of foramen magnum	29	35.59	0.47	2.56	7.18	31.00	43.00	22	33.41	0.42	1.99	5.96	30.00	39.00		++
8	Maximum breadth of skull	43	137.44	0.74	4.85	3.53	129.00	148.00	38	134.95	0.62	3.81	2.83	128.00	143.00		+
9	Minimum frontal breadth	39	94.51	0.62	3.86	4.98	86.00	102.00	32	92.75	0.75	4.22	4.55	86.00	104.00		
10	Maximum frontal breadth	38	116.58	0.67	4.12	3.54	110.00	126.00	33	112.76	1.00	5.73	5.08	103.00	131.00		++
11	Biauricular breadth	34	110.82	0.80	4.67	3.90	109.00	130.00	29	114.66	0.63	3.38	2.95	109.00	122.00		++
13.1	Bimastoideal breadth	35	122.57	0.88	5.19	4.24	114.00	131.00	30	116.47	0.70	3.83	3.29	109.00	126.00		++
BC	Bicristal breadth[1]	35	132.66	0.95	5.60	4.22	123.00	144.00	30	126.70	0.77	4.22	3.33	120.00	135.00		++
16	Breadth of foramen magnum	31	29.97	0.43	2.39	7.97	26.00	34.00	24	23.96	0.41	1.99	6.87	25.00	33.00		
17	Basion-bregma height	29	134.72	1.05	5.67	4.21	122.00	144.00	20	127.60	1.00	4.45	3.49	121.00	137.00		++
20	Porion-bregma height	36	112.81	0.70	4.22	3.74	104.00	122.00	30	108.43	0.75	4.13	3.81	102.00	116.00		
23	Horizontal circumference	31	522.35	2.31	12.88	2.47	500.00	546.00	28	505.13	1.88	9.94	1.97	484.00	530.00		++
24	Transverse curve	33	304.15	1.70	9.78	3.22	280.00	320.00	28	292.00	1.93	10.21	3.50	277.00	315.00		++
25	Sagittal curve	25	372.84	2.22	11.10	2.98	346.00	389.00	26	362.77	1.71	8.71	2.40	346.00	380.00		++
26	Frontal arch	35	126.69	0.91	5.37	4.24	116.00	140.00	35	122.80	1.00	5.94	4.84	114.00	134.00		
27	Parietal arch	39	126.95	1.00	6.26	4.93	114.00	140.00	37	125.27	1.21	7.35	5.87	111.00	139.00		
28	Occipital arch	27	117.52	1.37	7.13	6.07	105.00	131.00	29	115.14	1.28	6.92	6.01	104.00	132.00		
29	Frontal chord	35	111.94	0.70	4.15	3.71	103.00	121.00	35	107.69	0.73	4.34	4.03	99.00	114.00		
30	Parietal chord	39	113.54	0.78	4.85	4.27	104.00	126.00	38	111.61	0.86	5.32	4.77	100.00	121.00		
31	Occipital chord	34	98.47	0.97	5.65	5.74	86.00	109.00	31	96.90	0.83	4.61	4.75	89.00	110.00		
ML	Mastoid length[2]	52	31.62	0.41	2.95	9.34	26.00	37.00	49	28.20	1.41	2.86	10.16	19.00	34.00		++
MT	Mastoid thickness[3]	55	13.49	0.30	2.24	16.57	9.00	21.00	51	11.35	0.22	1.55	13.66	8.00	15.00	++	
MB	Mastoid breadth[4]	53	22.68	0.50	3.63	16.01	16.00	34.00	50	19.18	0.40	2.80	14.60	10.00	27.00		++
1	Cranial i. (8:1)	31	74.83	0.45	2.50	3.34	69.80	80.30	34	76.90	0.48	2.81	3.66	72.10	82.50		++
2	Basion height-length i. (17:1)	25	73.12	0.67	3.37	4.61	65.90	80.90	20	72.12	0.67	3.01	4.17	66.50	77.90		
3	Basion height-breadth i. (17:8)	29	97.85	0.85	4.59	4.69	89.70	107.50	20	94.26	0.81	3.63	3.85	89.60	103.80		++
MH	Mean height i. by Hrdlička $(17:\frac{1+8}{\text{div. by 2}})$	25	83.66	0.71	3.55	4.24	76.00	90.00	20	81.68	0.63	2.82	3.45	76.30	87.00		+
AC	Acroplatic i. (8–17:1)	23	1.82	0.73	3.50	192.29	−5.40	7.60	20	4.44	0.62	2.79	62.74	-2.70	8.00		++
4	Porion height-length i. (20:1)	29	61.43	0.39	2.08	3.39	56.80	66.10	29	61.27	0.47	2.52	4.12	56.60	65.90		
5	Porion height-breadth i. (20:8)	35	82.08	0.56	3.29	4.01	77.00	91.00	29	79.95	0.58	3.14	3.93	75.00	87.80		
HH	Height i. of neurocranium (20:17)	26	84.00	0.45	2.30	2.73	79.70	90.60	20	84.26	0.46	2.08	2.47	80.60	88.70		
BB	Breadth i. of neurocr. I (11:8)	33	87.49	0.59	3.38	3.86	80.40	94.80	28	84.82	0.55	2.89	3.41	79.70	90.40		++
BB'	Breadth i. of neurocr. II (13.1:8)	34	89.14	0.70	4.11	4.61	80.40	97.80	28	86.09	0.64	3.39	3.93	79.00	93.30		
BB"	Breadth i. of neurocr. III (BC:8)	34	96.55	0.58	3.36	3.48	88.00	103.00	29	93.62	0.58	3.12	3.33	88.40	100.00		++
SB	Breadth i. of skull base I (13.1:11)	33	102.20	0.48	2.75	2.69	95.90	107.60	29	101.60	0.41	2.23	2.19	94.90	105.10		
SB'	Breadth i. of skull base II (BC:11)	33	110.70	0.56	3.20	2.89	104.70	117.40	29	110.44	0.48	2.57	2.32	104.30	113.90		
10	Sagitt. i. of skull vault (1:25)+	25	49.43	0.20	0.99	2.01	47.50	51.20	25	48.50	0.24	1.21	2.48	45.70	51.00		
11	Transv. i. of skull vault (11:24)	32	39.61	0.30	1.69	4.26	36.10	42.90	27	39.40	0.32	1.66	4.21	35.60	41.50		
12	Tansversal frontal i. (9:10)	35	81.23	0.47	2.80	3.45	76.90	86.40	29	82.59	0.71	3.83	4.63	76.70	90.40		
13	Transv. frontoparietal i. (9:8)	35	68.68	0.57	3.40	4.94	62.10	75.40	30	68.54	0.65	3.54	5.17	63.40	78.30		
16	Sagitt. frontoparietal i. (27:26)	33	100.64	1.09	6.24	6.20	87.70	112.80	32	102.47	1.49	8.42	8.22	84.70	121.90		
17	Sagitt. frontooccipit. i. (28:26)	18	92.12	1.72	7.29	7.92	77.20	104.00	22	94.03	1.50	7.02	7.46	82.80	110.30		
18	Sagitt. parietooccipit. i. (28:27)	23	92.67	1.76	8.46	9.13	75.50	109.60	25	91.93	1.69	8.46	9.20	80.60	109.90		
19	Frontosagittal curve i. (26:25)	25	34.26	0.22	1.12	3.28	32.30	36.80	26	33.77	0.29	1.48	4.40	31.20	37.30		
20	Parietosagittal curve i. (27:25)	25	34.10	0.30	1.51	4.41	30.90	36.60	26	34.76	0.36	1.82	5.25	30.50	38.10		
21	Occipitosagitt. curve i. (28:25)	18	31.50	0.41	1.73	5.50	27.60	34.60	22	31.68	0.33	1.54	4.87	29.50	34.90		
22	Sagittal frontal i. (29:26)	35	88.40	0.25	1.50	1.70	84.60	91.50	35	87.75	0.34	2.03	2.31	83.70	92.10		
23	Sagittal parietal i. (30:27)	39	89.48	0.32	2.02	2.26	86.30	98.30	37	80.11	0.28	1.73	1.95	83.80	92.80		
24	Sagittal occipital i. (31:28)	27	83.51	0.37	1.90	2.28	79.60	87.10	27	85.16	0.55	2.84	3.33	78.10	91.60	+	
25	Foramen magnum index (16:7)	29	84.94	1.33	7.16	8.43	71.80	97.10	21	87.71	1.57	7.21	8.22	69.20	100.00		
33	Cranial modulus $(\frac{I+8+17}{\text{div. by 3}})$	25	152.16	0.75	3.75	2.47	145.00	157.70	20	146.70	0.69	3.09	2.11	140.70	151.70		++
MM	Mastoid modulus $(\frac{ML+MT+MB}{\text{div. by 3}})$	50	22.52	0.28	1.96	8.70	18.00	27.70	48	19.57	0.27	1.83	9.35	14.70	27.30		++

Explanations for tables 9:3 – 6:

No. = number of measurement according to Martin and Saller (1957), symbol of measurement or number of index according to the present author
n = number of cases
$\bar{x}$ = arithmetic mean
m = standard error of the mean $(\frac{s}{\sqrt{n}})$
s = standard deviation $(\sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}})$
V – coefficient of variation $(\frac{s}{\bar{x}} .100)$
min. = minimum value
max. = maximum value
i. = index
L = left
R = right

1 = maximum distance between both cristae supramastoideae
2 = according to **Giles and Elliot** (1963): a projective distance from the plane through porion to the tip of the process
3 = distance between the bottom of incisura mastoidea to the lateral prominence of the process
4 = maximum antero-posterior dimension, somewhat oblique in the longer axis of the process
5 = measured between the points of intersection of the zygomaxillary suture and the lower anterior edge of the adjoining bones
6 = mesiodistal length of the three molars
7 = from the zygomaxillary point to the bulge of the maxillary process in the middle of the mesiodistal length of the first molar
8 = distance from the deepest point of the incisura to the level of the preceding measurement
9 = according to Howells (1973): the minimum distance, in any direction, from the lower border of the orbit to the lower margin of the maxilla, mesial to the masseter attachment
+ = modification of the Martin and Saller (1957) technique

Tab: 9:4 Measurements and Indices of the Facial Skull

No.	Measurement/Index	Males							Females							Test	
		n	$\bar{x}$	m	s	V	min.	max.	n	$\bar{x}$	m	s	V	min.	max.	F	t
40	Facial length	15	93.20	0.83	3.23	3.29	92.00	103.00	13	93.08	1.24	4.48	4.81	85.00	101.00		
43	Upper facial breadth	34	103.18	0.70	4.10	3.97	96.00	110.00	27	90.67	0.77	3.93	3.99	92.00	107.00		++
44	Biorbital breadth	23	96.00	0.67	3.22	3.35	91.00	103.00	16	93.56	0.86	3.42	3.66	87.00	100.00		+
45	Bizygomatic breadth	18	130.39	1.07	4.53	3.47	123.00	143.00	12	120.75	0.97	3.36	2.78	113.00	124.00		+
46'	Mid-facial breadth[5]	26	95.58	0.74	3.80	3.97	88.00	102.00	16	92.75	0.90	3.61	3.89	87.00	99.00		
47	Facial height	9	112.89	2.77	8.30	7.35	104.00	126.00	11	108.73	1.45	4.82	4.43	102.00	116.00		
48	Upper facial height	19	69.58	0.88	3.85	5.53	58.00	75.00	15	67.80	0.87	3.33	4.99	63.00	74.00		
48.1	Maxilloalveolar height	31	19.52	0.48	2.66	13.61	15.00	24.00	33	18.55	0.37	2.12	11.45	14.00	22.00		
50	Anterior interorbital breadth	23	20.61	0.34	1.62	7.84	16.00	22.00	15	19.13	0.48	1.85	9.65	17.00	23.00		
51	Orbital breadth	23	40.96	0.30	1.46	3.57	39.00	44.00	15	40.07	0.41	1.58	3.94	38.00	43.00		
52	Orbital height	22	32.77	0.37	1.74	5.32	29.00	36.00	15	33.00	0.50	1.93	5.84	30.00	37.00		
54	Nasal breadth	32	24.81	0.27	1.55	6.26	22.00	28.00	30	23.93	0.27	1.46	6.10	22.00	26.00		
55	Nasal height	22	50.77	0.65	3.05	6.02	43.00	58.00	15	49.13	0.60	2.33	4.73	45.00	52.00		
60	Maxilloalveolar length	29	54.59	0.57	3.08	5.64	49.00	61.00	26	52.15	0.54	2.75	5.28	48.00	57.00		++
61	Maxilloalveolar breadth	29	61.66	0.47	2.53	4.10	56.00	66.00	25	58.80	0.50	2.52	4.28	54.00	64.00		
80.2	Upper dental length	17	41.59	0.37	1.54	3.71	38.00	45.00	14	39.71	0.52	1.94	4.88	36.00	43.00		++
UM	Upper molar length[6]	20	28.10	0.53	2.36	8.40	20.00	31.00	13	27.15	0.36	1.28	4.72	25.00	29.00	+	
38	Facial i.by Kollmann (47:45)	7	86.27	2.47	6.54	7.58	78.90	96.10	9	90.59	1.56	4.68	5.17	83.10	96.70		
38.1	Facial i.by Virchow (47:46)	9	116.88	2.17	6.51	5.57	107.10	126.30	10	118.66	1.70	5.36	4.52	109.60	128.70		
39	Upper fac. i.by Kollmann (48:45)	13	53.66	0.75	2.70	5.04	48.90	57.70	12	56.14	0.89	3.08	5.48	50.80	60.80		+
39.1	Upper fac.i.by Virchow (48:46')	19	72.51	0.91	3.96	5.46	64.40	80.70	14	73.43	0.89	3.32	4.52	67.00	79.60		
41	Jugomalar i. (46':45)	16	73.02	0.80	3.21	4.40	68.80	79.00	12	76.83	0.91	3.16	4.11	70.70	82.50		
42	Orbital i. (52:51)	21	80.25	0.93	4.26	5.31	70.70	87.50	15	82.37	0.95	3.69	4.48	76.70	88.10		
46 a	Interorbital i. (50:44)	19	21.25	0.40	1.75	8.22	17.20	23.90	15	20.43	0.45	1.74	8.51	18.50	24.00		
48	Nasal i. (54:55)	21	49.22	0.74	3.38	6.88	43.10	56.30	15	48.56	1.08	4.18	8.60	42.30	54.20		
51.1	Transv. nasofacial i. (54:45)	16	19.16	0.32	1.27	6.62	16.80	21.00	12	19.47	0.37	1.28	6.56	18.00	22.00		
51.2	Vertic. nasofacial i. (55:48)+	19	72.88	0.75	3.26	4.47	67.60	79.50	15	72.52	0.67	2.61	3.60	68.60	77.80		
54	Maxilloalveolar i. (61:60)	25	113.70	1.31	6.56	5.77	101.70	124.50	20	111.90	1.59	7.13	6.37	96.50	127.10		
60	Gnathic i. (40:5)	15	95.49	0.67	2.58	2.71	91.50	99.00	13	97.98	0.93	3.54	3.61	91.80	102.10		
61	Facial modulus $(\frac{40+45+47}{\text{div.by } 3})$	7	113.20	1.02	2.69	2.38	110.00	118.00	9	107.42	1.00	2.99	2.78	101.70	111.00		+
68	Upper dental i. (80.2:5)	8	40.46	0.81	2.29	5.66	35.80	42.90	8	41.11	1.10	3.10	7.54	37.00	45.70		
UM	Upper molar i. (UM:5)	10	26.85	0.93	2.95	11.00	20.20	29.70	7	27.86	0.73	1.92	6.89	25.00	29.80		
69	Longit. craniofacial i. (40:1)	15	53.24	0.44	1.71	3.21	50.00	55.00	13	53.02	0.45	1.61	3.04	50.90	55.70		
70	Vertic. craniofacial i. (48:17)+	15	50.68	0.75	2.92	5.76	43.90	55.70	14	52.60	0.86	3.24	6.15	47.40	58.30		
71	Transv. craniofacial i. (45:8)	18	94.13	1.08	4.58	4.67	45.50	102.10	12	88.63	0.93	3.38	7.81	82.50	93.80		

Tab. 9:5 Measurements and Indices of Facial Profilation

No.	Measurement/Index	Males							Females							Test	
		n	$\bar{x}$	m	s	V	min.	max.	n	$\bar{x}$	m	s	V	min.	max.	F	t
32A	Tangent. angle of frontal slope	17	77.18	0.93	3.83	4.96	70.00	84.00	15	80.67	1.19	4.62	5.73	74.00	88.00		
72	Total profile angle	17	84.88	0.75	3.08	3.63	80.00	89.00	15	83.27	0.92	3.56	4.27	73.00	88.00		
73	Nasal profile angle	17	86.35	0.72	2.96	3.42	82.00	91.00	15	85.87	0.66	2.56	2.98	82.00	90.00		
74	Alveolar profile angle	17	77.59	1.50	6.19	7.97	68.00	88.00	15	75.20	1.71	6.64	8.82	64.00	85.00		
75	Profile angle of nasal roof	14	55.43	1.21	4.52	8.15	47.00	62.00	10	57.30	1.91	6.04	10.54	49.00	65.00		
78	Sagitt. angle of orbital entrance plane	17	93.47	1.00	4.11	4.40	88.00	106.00	15	89.67	0.73	2.82	3.14	85.00	94.00		
76	Malar profile angle	17	110.00	1.05	4.32	3.63	110.00	129.00	15	116.80	1.13	4.39	3.76	109.00	123.00		
43.1	Inner biorbital facial breadth	26	95.81	0.68	3.48	3.63	90.00	103.00	20	92.75	0.85	3.80	4.09	86.00	99.00		
NH	Nasion height above 43.1	26	17.13	0.51	2.61	15.21	12.50	21.00	20	14.72	0.46	2.04	13.87	9.00	18.50		
57	Minimum breadth of nasal bones	22	11.18	0.30	1.40	12.54	7.50	14.00	12	9.88	0.46	1.58	16.03	7.00	12.50		
SS	Simotic subtense above 57	22	4.39	0.21	0.96	21.95	2.00	6.00	12	3.71	0.23	0.78	21.00	2.50	5.00		
BH	Height of nasal bridge 50	18	7.69	0.23	0.97	12.64	6.00	9.50	13	6.81	0.24	0.85	12.56	5.00	8.00		+
SH	Subspinal height above 46'	24	23.56	0.77	3.77	15.99	16.00	32.00	15	23.13	0.61	2.35	10.15	19.00	29.50		
BI	Breadth of incisura maxillaris[7]	17	25.74	0.59	2.45	9.52	19.00	30.00	19	25.53	0.57	2.50	9.80	19.00	29.00		
DI	Depth of incisura maxillaris[8]	17	7.26	0.23	0.94	12.90	5.00	9.00	19	6.68	0.24	1.06	15.81	5.00	9.00		
MH	Malar height[9]	38	22.37	0.31	1.92	8.60	18.00	25.00	36	20.64	0.30	1.78	8.60	17.00	25.00		
FF	I. of facial flatness (NH:43.1)	26	17.92	0.56	2.87	16.04	12.50	22.60	20	15.89	0.51	2.30	14.46	10.10	21.00		
SI	Simotic i. (SS:57)	22	39.58	2.01	9.41	23.77	20.00	60.00	12	37.62	1.71	5.94	15.78	28.60	50.00		
NP	Nasal prominence i. (BH:50)	18	38.07	1.70	7.21	18.93	27.30	56.30	13	36.30	1.44	5.19	14.28	27.80	44.40		
ZM	Zygomaxillar i. (SH:46')	24	24.59	0.74	3.63	14.78	16.30	32.30	15	24.98	0.46	1.80	7.21	21.80	29.80	++	
IM	I. of incisura maxillaris (TI:BI)	17	28.54	1.23	5.09	17.82	18.50	40.00	19	26.43	1.11	4.85	18.34	17.90	36.80		

Tab. 9:6 Measurements and Indices of the Mandible

No. Measurement/Index	Males							Females							Test	
	n	$\bar{x}$	m	s	V	min.	max.	n	$\bar{x}$	m	s	V	min.	max.	F	t
65 Bicondylar breadth	28	118.75	0.91	4.81	4.05	105.00	125.00	32	111.66	0.95	5.37	4.81	100.00	124.00		
66 Bigonial breadth	36	98.03	0.96	5.75	5.87	84.00	110.00	36	90.33	0.78	4.66	5.16	82.00	100.00		
68.1 Mandibular length	38	104.47	0.93	5.70	5.46	90.00	116.00	41	99.78	0.65	4.14	4.15	87.00	108.00		+ +
69 Symphysis height	38	32.24	0.41	2.55	7.91	28.00	37.00	36	29.11	0.40	2.39	8.20	25.00	35.00		
69.1 Height of the body	46	31.91	0.39	2.62	8.22	28.00	37.00	45	29.24	0.30	2.01	6.88	25.00	34.00		+ +
69.3 Thickness of the body	47	11.74	0.19	1.31	11.15	9.00	14.00	46	10.89	0.18	1.23	11.32	9.00	14.00		+ +
70 Height of ascending ramus I	43	64.16	0.67	4.42	6.89	55.00	74.00	46	57.09	0.70	4.78	8.37	45.00	64.00		+ +
70a Height of ascending ramus II	43	57.47	0.99	6.47	11.26	46.00	76.00	46	50.52	0.70	5.35	10.59	37.00	62.00		+ +
71 Minim. breadth of ascend. ramus	47	32.26	0.39	2.71	8.39	26.00	39.00	50	31.98	0.35	2.46	7.70	28.00	38.00		
79 Gonial (mandibular) angle	42	121.83	0.91	5.93	4.86	103.00	135.00	45	124.04	0.77	5.15	4.15	116.00	138.00		
80.2 Lower dental length	26	44.73	0.40	2.03	4.54	41.00	50.00	22	42.41	0.56	2.63	6.20	37.00	46.00		
L LM Lower molar length	27	31.67	0.27	1.41	4.47	29.00	35.00	28	29.93	0.27	1.44	4.81	26.00	32.00		+ +
62 Mandibular index (68.1:65)	28	87.60	1.13	5.96	6.80	75.60	100.00	31	89.77	1.06	5.88	6.55	78.40	100.00		
63 Ascending ramus i.I (71:70)	42	50.60	0.69	4.45	8.79	41.80	59.70	45	56.24	0.95	6.35	11.29	45.30	71.40		+ +
63' Ascending ramus i.II (71:70a)+	42	56.80	0.90	5.85	10.30	42.10	72.90	45	63.76	1.12	7.51	11.78	50.90	86.50		+ +
64 Breadth i.of mandible (66:65)	28	82.84	0.91	4.83	5.84	72.00	94.00	31	80.76	0.72	4.03	4.99	71.90	89.70		
66 Thickness of mand. body i. (69.3:69.1)	46	37.05	0.73	4.93	13.30	28.10	48.30	45	37.20	0.57	3.82	10.25	28.10	46.20		
68' Lower dental i. (80.2:5)	11	44.12	0.84	2.78	6.30	40.20	48.40	11	44.62	1.06	3.51	7.87	37.80	48.90		
LM Lower molar i. (LM:5)	12	31.66	0.62	2.16	6.81	29.00	35.50	14	31.29	0.61	2.29	7.33	26.50	34.00		
40 Jugomandibular i. (66:45)	9	75.67	1.15	3.46	4.57	70.10	79.70	8	75.24	1.06	3.01	4.00	71.30	79.80		
FM Frontomandibular i. (66:9)	20	103.77	1.01	4.53	4.36	96.90	111.70	21	98.58	1.53	7.01	7.11	84.80	112.60		+ +

Tab. 9:7 Comparison of Craniometric Data between the Series of Abusir and Giza*

No.	Measurement or index	Males											Females										
		Abusir					Giza					Test	Abusir					Giza					Test
		n	$\bar{x}$	m	s	V	n	$\bar{x}$	m	s	V	F t	n	$\bar{x}$	m	s	V	n	$\bar{x}$	m	s	V	F t
1	Maximum length of skull	32	184.63	0.89	5.03	2.72	895	185.34	0.13	5.72	3.09	— —	35	176.31	0.91	5.40	3.06	589	177.06	0.12	4.72	2.66	— —
5	Length of skull base	25	102.52	0.85	4.24	4.14	896	101.64	0.09	3.97	3.90	— —	19	95.11	0.95	4.12	4.33	595	96.51	0.10	3.52	3.65	— +
7	Length of foramen magnum	29	35.59	0.47	2.56	7.18	894	35.56	0.06	2.47	6.95	— —	22	33.41	0.42	1.99	5.96	602	34.39	0.06	2.19	6.37	— +
8	Maximum breadth of skull	43	137.44	0.74	4.85	3.53	896	138.88	0.11	4.76	3.43	— +	38	134.95	0.62	3.81	2.83	587	135.55	0.13	4.52	3.34	— —
9	Minimum frontal breadth	39	94.51	0.62	3.86	4.08	935	94.78	0.09	4.05	4.28	— —	32	92.75	0.75	4.22	4.55	628	92.25	0.10	3.79	4.11	— —
16	Breadth of foramen magnum	31	29.97	0.43	2.39	7.97	905	29.96	0.05	2.15	7.18	— —	24	28.96	0.41	1.99	6.87	607	28.79	0.05	2.00	6.96	— —
17	Basion-bregma height	29	134.72	1.05	5.67	4.21	884	134.08	0.11	5.03	3.75	— —	20	127.60	1.00	4.45	3.49	582	129.20	0.12	4.37	3.39	— —
20	Porion-bregma height	36	112.81	0.70	4.22	3.74	887	113.43	0.09	4.12	3.63	— —	30	108.43	0.75	4.13	3.81	588	109.98	0.10	3.65	3.32	— +
23	Horizontal circumference	31	522.35	2.31	12.88	2.47	876	518.66	0.31	13.77	2.65	— —	28	505.18	1.88	9.94	1.97	583	499.69	0.33	11.76	2.35	— ++
24	Transverse curve	33	304.15	1.70	9.78	3.22	878	307.19	0.23	9.89	3.22	— +	28	292.00	1.93	10.21	3.50	579	296.35	0.25	8.84	2.98	— ++
25	Sagittal curve	25	372.84	2.22	11.10	2.98	884	371.86	0.28	12.51	3.36	— —	26	362.77	1.71	8.71	2.40	583	359.75	0.29	10.49	2.92	— —
26	Frontal arch	35	126.69	0.91	5.37	4.24	928	127.42	0.14	6.22	4.88	— —	35	122.80	1.00	5.94	4.84	617	123.86	0.15	5.65	4.56	— —
27	Parietal arch	39	126.95	1.00	6.26	4.93	908	128.46	0.17	7.42	5.77	— —	37	125.27	1.21	7.35	5.87	606	123.90	0.18	6.43	5.19	— —
28	Occipital arch	27	117.52	1.37	7.13	6.07	889	115.23	0.15	6.81	5.91	— +	29	115.14	1.28	6.92	6.01	593	111.59	0.19	6.77	6.06	— ++
31	Occipital chord	34	98.47	0.97	5.65	5.74	885	97.07	0.11	4.81	4.96	— +	31	96.90	0.83	4.61	4.75	594	94.66	0.13	4.75	5.02	— ++
40	Facial length	15	98.20	0.83	3.23	3.29	832	95.03	0.11	4.85	5.10	+ ++	13	93.08	1.24	4.48	4.81	563	90.75	0.12	4.08	4.49	— +
45	Bizygomatic breadth	18	130.39	1.07	4.53	3.47	785	128.70	0.11	4.57	3.55	— —	12	120.75	0.97	3.36	2.78	500	120.87	0.13	4.38	3.62	— —
46	Mid-facial breadth	26	95.58	0.74	3.80	3.97	877	95.20	0.11	4.67	4.90	— —	16	92.75	0.90	3.61	3.89	581	91.56	0.12	4.35	4.75	— —
48	Upper facial height	19	69.58	0.88	3.85	5.53	845	70.41	0.10	4.15	5.90	— —	15	67.80	0.87	3.38	4.99	567	66.74	0.11	3.76	5.64	— —
54	Nasal breadth	32	24.81	0.27	1.55	6.26	893	24.36	0.04	1.77	7.27	— —	30	23.93	0.27	1.46	6.10	591	23.55	0.05	1.64	6.98	— —
55	Nasal height	22	50.77	0.65	3.05	6.02	898	51.65	0.07	2.92	5.65	— —	15	49.13	0.60	2.33	4.73	593	48.97	0.07	2.60	5.31	— —
72	Total profile angle	17	84.88	0.75	3.08	3.63	795	85.81	0.08	3.24	3.78	— —	15	83.27	0.92	3.56	4.27	529	84.93	0.09	2.95	3.48	— +
1	Cranial i. (8:1)	31	74.83	0.45	2.50	3.34	884	75.06	0.06	2.68	3.57	— —	34	76.90	0.48	2.81	3.66	584	76.61	0.07	2.56	3.34	— —
2	Basion height-lenght i. (17:1)	25	73.12	0.67	3.37	4.61	871	72.46	0.07	2.94	4.06	— —	20	72.12	0.67	3.01	4.17	570	73.07	0.08	2.85	3.90	— —
25	Foramen magnum index (16:7)	29	84.94	1.33	7.16	8.43	889	84.47	0.13	5.79	6.86	+ —	21	87.71	1.57	7.21	8.22	597	83.95	0.15	5.62	6.69	+ +
39.1	Upper fac. i. by Virchow (48:46)	19	72.51	0.91	3.96	5.46	823	74.13	0.12	4.96	6.69	— —	14	73.43	0.89	3.32	4.52	547	73.03	0.13	4.48	6.14	— —
48	Nasal i. (54 : 55)	21	49.22	0.74	3.38	6.88	881	47.31	0.09	3.82	8.08	— +	15	48.56	1.08	4.18	8.60	580	47.75	0.11	3.77	7.90	— —

Explanations:
+ = XXVIth — XXXth Dynasty series from Giza by Pearson and Davin (1924)
n = number of cases
$\bar{x}$ = arithmetic mean
m = standard error of the mean
s = standard deviation
V = coefficient of variation

Tab. 9:8 Comparison of Skull and Head Measurements between Historical and Recent⁺ Abusir Males

No_1	No_2	Measurement	Abusir – Secondary Cemetery				Abusir – Recent Population					Test	
			n	$\bar{x}$	s	V	n	$\bar{x}_1$	$\bar{x}_2$	s	V	F	t
1	1	Maximum length	32	184.63	5.03	2.72	64	191.5	182.5	7.1	3.7	+	+
8	3	Maximum breadth	43	137.44	4.85	3.53	64	142.1	134.1	4.9	3.4	–	+
9	4	Minimum frontal breadth	39	94.51	3.86	4.08	64	108.1	99.1	4.8	4.4	–	++
45	6	Bizygomatic breadth	18	130.39	4.53	3.47	64	134.5	126.5	4.6	3.4	–	+
47	18	Facial height	9	112.89	8.30	7.35	64	117.9	112.9	6.8	5.8	–	–
55	21	Nasal height	22	50.77	3.05	6.02	64	49.6	49.6	3.4	6.9	–	–
66	8	Bigonial breadth	36	93.03	5.75	5.87	64	104.9	92.9	5.7	5.4	–	–

Explanations:
⁺ = series of recent males from Abusir by Strouhal and Reisenauer (1963)
No_1 = number according to Martin and Saller (1957, 1959) for craniometric data
No_2 = number according to Martin and Saller (1957, 1959) for head measurements
n = number of cases
$\bar{x}$ = arithmetic mean
$\bar{x}_1$ = original arithmetic mean
$\bar{x}_2$ = arithmetic mean corrected for soft tissue thickness (see note 45)
s = standard deviation
V = coefficient of variation

Tab. 10:1 Survey of the Frequency of Significant F- and t-tests in Postcranial Measurements and Indices

Comparison	Test	Sternum		Vertebrae (N = 24)		Sacrum		Pelvis		Clavicle (N = 6)		Humerus (N = 14)		Radius (N = 10)		Ulna (N = 10)		Femur (N = 26)		Tibia (N = 16)		Fibula (N = 10)		Small leg bones (N = 6)		Total		Total except weight	
		n/N	%	n	%	n/N	%	n/N	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n/N	%	n/N	%
$M_1 : F_1$	F	0/2	0.0	6	25.0	0/6	0.0	0/11	0.0	1	16.7	0	0.0	0	0.0	1	10.0	10	38.5	2	12.5	0	0.0	0	0.0	20/141	14.2	18/141	12.8
	t	0/2	0.0	12	50.0	2/6	33.3	5/11	45.5	2	33.3	9	64.3	8	80.0	7	70.0	21	80.8	11	68.8	3	30.0	4	66.7	84/141	59.6	63/141	44.7
$M_2 : F_2$	F	0/2	0.0	4	16.7	0/11	0.0	2/19	10.5	0	0.0	0	0.0	0	0.0	2	20.0	9	34.6	2	12.5	0	0.0	2	33.3	21/154	13.6	20/154	13.0
	t	1/2	50.0	9	37.5	1/11	9.1	11/19	57.9	4	66.6	13	92.9	8	80.0	9	90.0	17	65.4	9	56.3	4	40.0	5	83.3	90/154	58.4	68/154	44.2
$M_1 : M_2$	F	0/3	0.0	2	8.3	1/11	9.1	0/19	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3/155	1.9	3/131	2.3
	t	0/3	0.0	2	8.3	0/11	0.0	1/19	5.3	2	33.3	2	14.3	3	30.0	2	20.0	2	7.7	5	31.3	1	10.0	0	0.0	20/155	12.9	7/131	5.3
$F_1 : F_2$	F	0/2	0.0	2	8.3	0/6	0.0	0/19	0.0	1	16.7	0	0.0	0	0.0	2	20.0	1	3.8	0	0.0	0	0.0	0	0.0	6/149	4.0	6/125	4.8
	t	0/2	0.0	4	16.7	0/6	0.0	0/19	0.0	0	0.0	2	14.3	0	0.0	0	0.0	6	23.1	4	25.0	0	0.0	0	0.0	16/149	10.7	6/125	4.8

Explanations:
N = number of measurements or indices
n = number of significantly different measurements or indices
% = percentage of significantly different measurements or indices
M_1 = males, first series
M_2 = males, second series
F_1 = females, first series
F_2 = females, second series
Significance at the 0.05 % level

Tab. 10:2 Infracranial Measurements and Indices Differing Significantly between Both Series

No.	Bone	Measurement / Index	First series						Second series						Test	
			n	$\bar{x}$	m	s	min.	max.	n	$\bar{x}$	m	s	min.	max.	F	t
Males																
05	Vertebra:	C_5 ant. vert. diam.	9	11.44	0.24	0.73	10	12	29	10.62	0.27	1.45	8	13	+	
06		C_6 ant. vert. diam.	9	12.44	0.29	0.88	11	14	28	11.32	0.27	1.44	9	14		+
09		Th_2 ant. vert. diam.	12	16.92	0.15	0.51	16	18	26	16.77	0.23	1.17	13	19	++	
012		Th_5 ant. vert. diam.	19	18.68	0.22	0.95	17	21	28	17.89	0.26	1.37	15	20		+
S6L	Sacrum:	depth of concavity§	9	18.66	2.57	7.70	7	28	9	21.66	1.05	3.16	17	25	+	
P12L	Pelvis:	ilium breadth — L	10	156.80	1.61	5.09	147	165	5	151.20	1.46	3.27	147	156		+
C1R	Clavicle:	length — R	12	153.33	2.79	9.68	139	175	23	144.74	1.56	7.48	131	155		++
C11R		robusticity i. (6:1) — R	12	24.35	0.57	1.99	21.9	28.8	23	26.70	0.46	2.21	21.6	32.4		++
HWL	Humerus:	weight — L	12	131.42	6.27	21.73	100	175	17	113.82	3.25	13.41	90	145		+
H11L		weight/length i. (W:1) — L	12	4.12	0.17	0.60	3.4	5.3	17	3.63	0.09	0.39	3.0	4.5		+
RWR	Radius:	weight — R	14	44.07	2.09	7.83	35	65	17	36.76	1.35	5.57	30	50		++
RWL		weight — L	13	43.00	1.94	6.99	35	55	18	37.78	1.41	6.00	30	50		+
R11R		weight/length i. (W:1) — R	14	1.77	0.07	0.27	1.5	2.5	17	1.50	0.05	0.19	1.2	1.9		++
UWR	Ulna:	weight — R	14	58.36	2.87	10.75	45	80	15	47,33	2.00	7.76	40	60		++
U11L		weight/length i. (W:1) — L	9	2.13	0.08	0.24	1.8	2.4	14	1.77	0.06	0.24	1.4	2.1		++
FWR	Femur:	weight — R	20	360.49	11.18	50.00	265	450	17	309.41	9.46	39.01	225	375		++
FWL		weight — L	19	365.26	8.71	37.95	305	445	18	311.11	10.44	44.28	225	390		++
TWL	Tibia:	weight — L	18	217.78	6.68	28.35	180	275	21	188.10	4.90	22.44	135	225		++
T11L		weight/length i. (W:1) — L	18	5.94	0.14	0.61	5.0	7.1	21	5.16	0.14	0.63	3.7	6.8		++
T11R		weight/length i. (W:1) — R	11	5.83	0.12	0.41	5.3	6.6	14	5.01	0.12	0.45	4.2	5.8		++
T12L		i. cnemicus — L	26	64.46	1.12	5.69	51.3	73.5	27	69.16	1.07	5.54	59.0	78.1		++
T12R		i. cnemicus — R	24	67.29	1.43	7.00	51.3	80.6	27	70.78	1.00	5.20	58.8	78.1		+
V11R	Fibula:	weight/length i. (W:1) — R	11	1.39	0.05	0.18	1.1	1.8	8	1.21	0.05	0.16	1.1	1.5		+
Females																
05	Vertebra:	C_5 ant. vert. diam.	10	9.40	0.34	1.08	8	11	29	10.10	0.16	0.90	8	12		+
07		C_7 ant. vert. diam.	8	11.38	0.42	1.19	10	13	29	12.76	0.17	0.91	11	14		++
012		Th_5 ant. vert. diam.	10	17.30	0.42	1.34	15	19	29	16.41	0.20	1.08	14	19		+
016		Th_9 ant. vert. diam.	6	18.83	0.17	0.41	18	19	27	18.81	0.20	1.04	17	21	+	
021		L_2 ant. vert. diam.	7	23.57	0.20	0.53	23	24	26	24.73	0.23	1.15	23	27		+
023		L_4 ant. vert. diam.	12	23.75	0.22	0.75	23	25	29	25.00	0.29	1.60	22	28	+	
C1R	Clavicle:	length — R	9	132.00	1.15	3.46	127	138	20	131.85	1.82	8.15	119	148	+	
HWL	Humerus:	weight — L	7	80.00	6.36	16.83	50	95	14	63.21	3.46	12.95	40	80		+
H11L		weight/length i. (W:1) — L	7	2.75	0.21	0.57	1.8	3.5	14	2.22	0.12	0.44	1.5	2.8		+
U3R	Ulna:	minim. circumference — R	9	30.22	1.14	3.42	26	35	20	31.85	0.39	1.73	29	36	+	
U12R		robusticity i. (3:1) — R	4	13.28	0.83	1.66	11.2	14.8	10	12.90	0.19	0.59	11.6	13.5	+	
FWR	Femur:	weight — R	5	245.00	5.24	11.73	235	265	16	191.25	8.58	34.33	125	250		++
F6R		midshaft a.-p. diam. — R	15	24.06	0.30	1.16	22	26	32	25.12	0.29	1.68	21	29		+
F10R		subtroch. a.-p. diam. — R	15	21.20	0.20	0.77	20	22	31	21.55	0.23	1.28	19	25	+	
FWL		weight — L	9	247.78	6.46	19.38	220	275	18	197.50	6.55	27.77	140	235		++
F21L		weight/length i. (W:1) — L	9	6.13	0.15	0.44	5.3	6.5	15	4.81	0.19	0.73	3.2	5.8		+
F21R		weight:length i. (W:1) — R	5	6.00	0.14	0.32	5.6	6.3	14	4.79	0.20	0.73	3.2	5.9		++
F23R		i. pilastricus — R	15	100.22	1.84	7.13	88	113	32	108.32	1.47	8.30	92	126		++
TWR	Tibia:	weight — R	7	159.29	6.31	16.69	135	180	22	108.41	4.23	19.84	65	145		++
TWL		weight — L	10	142.00	3.51	11.11	120	150	17	107.94	4.81	19.85	65	145		++
T11R		weight/length i. (W:1) — R	7	4.68	0.11	0.28	4.4	5.2	21	3.29	0.13	0.58	2.1	4.2		++
T11L		weight/length i. (W:1) — L	10	4.24	0.12	0.37	3.6	4.7	17	3.25	0.14	0.56	2.1	4.2		+

Explanations:
No. = number of measurement according to Martin and Saller (1957), symbol of measurement or number of index according to the present author
n = number of cases
$\bar{x}$ = arithmetic mean
m = standard error of the mean
s = standard deviation
min. = minimum value of the range
max. = maximum value of the range
§ = five-piece sacrum
+ = statistically significant difference (p = 0.05) (also in the following tables)
++ = statistically highly significant difference (p = 0.01) (also in the following tables)

Tab. 10:3 Systematic Differences in Weight and Weight–Length Indices of the Long Bones

Bone	Right							Left						
	First series			Second series			Ratio	First series			Second series			Ratio
	n	$\bar{x}$	s	n	$\bar{x}$	s		n	$\bar{x}$	s	n	$\bar{x}$	s	
Males														
Humerus–W.	18	136.50	21.04	18	115.00	15.90	1.1870	12	131.42	21.73	17	113.82	13.41	1.1546
Radius–W.	14	44.07	7.83	17	36.76	5.57	1.1989	13	43.00	6.99	18	37.78	6.00	1.1382
Ulna–W.	14	58.36	10.75	15	47.33	7.76	1.2330	9	57.00	7.81	15	47.33	7.53	1.2043
Femur–W.	20	360.50	50.00	17	309.41	39.01	1.1651	19	365.26	37.95	18	311.11	44.28	1.1741
Tibia–W.	11	216.81	18.34	15	188.00	23.96	1.1532	18	217.78	28.35	21	188.10	22.44	1.1578
Fibula–W.	11	47.72	6.07	9	43.33	6.61	1.1013	5	46.00	6.52	7	40.71	6.73	1.1299
Humerus–I.	18	4.26	0.54	18	3.61	0.48	1.1801	12	4.12	0.60	17	3.63	0.39	1.1350
Radius–I.	14	1.77	0.27	17	1.50	0.19	1.1800	12	1.76	0.25	18	1.53	0.23	1.1503
Ulna–I.	13	2.22	0.37	15	1.79	0.27	1.2402	9	2.13	0.24	14	1.78	0.24	1.1966
Femur–I.	20	8.12	0.93	14	7.00	0.75	1.1600	19	8.29	0.67	17	6.92	0.92	1.1980
Tibia–I.	11	5.84	0.41	14	5.01	0.45	1.1657	18	5.94	0.61	21	5.16	0.63	1.1512
Fibula–I.	11	1.39	0.18	8	1.21	0.16	1.1488	4	1.35	0.24	7	1.16	0.17	1.1638
Females														
Humerus–W.	5	89.60	8.41	15	66.33	13.82	1.3508	7	80.00	16.83	14	63.21	12.95	1.2656
Radius–W.	4	24.50	3.32	10	22.50	4.25	1.0889	6	27.00	3.46	16	22.50	4.08	1.2000
Ulna–W.	2	32.50	10.60	10	26.50	5.80	1.2264	3	31.67	2.89	15	27.00	4.14	1.1730
Femur–W.	5	245.00	11.73	16	191.25	34.33	1.2810	9	247.78	19.38	18	197.50	27.77	1.2546
Tibia–W.	7	159.29	16.69	22	108.41	18.84	1.4693	10	142.00	11.11	17	107.94	19.85	1.3155
Fibula–W.	2	37.50	3.54	12	30.83	6.34	1.2163	6	31.67	4.08	8	31.25	6.94	1.0134
Humerus–I.	5	3.08	0.26	15	2.27	0.50	1.3568	7	2.76	0.57	14	2.22	0.44	1.2432
Radius–I.	4	1.10	0.18	10	1.03	0.18	1.0680	6	1.27	0.12	16	1.02	0.20	1.2451
Ulna–I.	2	1.35	0.35	10	1.11	0.23	1.2162	3	1.37	0.12	14	1.17	0.16	1.1709
Femur–I.	5	6.00	0.32	14	4.79	0.73	1.2526	9	6.13	0.44	15	4.81	0.73	1.2744
Tibia–I.	7	4.69	0.28	21	3.29	0.58	1.4255	10	4.24	0.37	17	3.25	0.56	1.3046
Fibula–I.	2	1.20	0.14	12	0.95	0.17	1.2632	6	0.97	0.15	8	0.95	0.20	1.0211

Explanations
n – number of cases
$\bar{x}$ – arithmetic mean
s – standard deviation
W. – weight
I. – weight–length index
ratio – mean of the first series divided by the mean of the second series

Tab. 10:4 Measurements and Indices of the Trunk

No.	Bone	Measurement / Index	Males							Females							Test	
			n	$\bar{x}$	m	s	V	min.	max.	n	$\bar{x}$	m	s	V	min.	max.	F	t
Q 2	Sternum:	length of manubrium	23	49.5	0.8	3.8	7.7	42.0	58.0	14	41.9	0.9	3.4	7.8	36.0	49.0		++
Q 3		length of corpus	13	101.5	3.6	12.8	12.7	86.0	132.0	6	89.7	5.9	14.4	16.1	67.0	105.0		
Q 11		i. manubr. / corpus (2:3)	11	48.7	2.0	6.5	13.4	34.1	58.1	1	62.0	0.0	0.0	0.0	62.0	62.0		
O 1	Vertebra:	C_1 transv. diameter	35	77.1	0.8	4.6	5.9	70.0	89.0	24	60.2	0.6	3.1	4.5	64.0	76.0		++
O 2		C_2 anterior vertical diameter	46	36.9	0.3	2.2	5.8	32.0	41.0	40	33.8	0.4	2.4	7.0	27.0	37.0		
O 3		C_3 anterior vertical diameter	39	12.1	0.2	1.2	10.1	9.0	15.0	36	10.8	0.2	1.0	9.3	8.0	13.0		++
O 4		C_4 anterior vertical diameter	41	11.7	0.2	1.4	12.4	9.0	15.0	40	10.5	0.2	1.0	9.7	8.0	12.0	+	+
O 5		C_5 anterior vertical diameter	38	10.8	0.2	1.4	12.5	8.0	13.0	39	9.9	0.2	1.0	9.9	8.0	12.0		++
O 6		C_6 anterior vertical diameter	37	11.6	0.2	1.4	12.1	9.0	14.0	40	10.8	0.2	1.1	10.2	9.0	13.0		++
O 7		C_7 anterior vertical diameter	45	13.5	0.2	1.2	9.1	11.0	16.0	37	12.5	0.2	1.1	9.0	10.0	14.0		
O 8		Th_1 anterior vertical diameter	40	15.3	0.1	0.9	6.0	13.0	17.0	39	14.2	0.2	0.9	6.6	12.0	16.0		++
O 9		Th_2 anterior vertical diameter	38	16.8	0.2	1.0	6.0	13.0	19.0	34	15.6	0.2	1.1	7.1	13.0	18.0		
O 10		Th_3 anterior vertical diameter	43	17.3	0.2	1.2	7.2	14.0	19.0	36	15.9	0.2	1.0	6.6	14.0	18.0		++
O 11		Th_4 anterior vertical diameter	45	17.4	0.2	1.2	7.0	15.0	20.0	36	16.3	0.2	1.2	7.4	14.0	19.0		++
O 12		Th_5 anterior vertical diameter	47	18.2	0.2	1.3	7.0	15.0	21.0	39	16.6	0.2	1.2	7.2	14.0	19.0		
O 13		Th_6 anterior vertical diameter	52	18.3	0.2	1.2	6.6	15.0	21.0	38	17.1	0.2	1.1	6.5	15.0	20.0		
O 14		Th_7 anterior vertical diameter	51	19.0	0.2	1.2	6.5	16.0	22.0	38	17.5	0.2	1.1	6.2	15.0	19.0		++
O 15		Th_8 anterior vertical diameter	49	19.7	0.2	1.5	7.4	17.0	24.0	35	18.2	0.2	0.9	5.1	16.0	20.0	++	+
O 16		Th_9 anterior vertical diameter	43	20.4	0.2	1.5	7.3	17.0	24.0	33	18.8	0.2	1.0	5.1	17.0	21.0	++	+
O 17		Th_{10} anterior vertical diameter	46	21.0	0.2	1.4	6.6	18.0	25.0	36	19.5	0.2	1.0	5.3	18.0	22.0		
O 18		Th_{11} anterior vertical diameter	38	21.4	0.2	1.4	6.7	20.0	26.0	33	20.3	0.2	1.1	5.6	18.0	23.0		++
O 19		Th_{12} anterior vertical diameter	42	22.6	0.3	1.6	7.2	20.0	27.0	36	22.2	0.2	1.2	5.6	19.0	24.0		
O 20		L_1 anterior vertical diameter	54	24.1	0.2	1.7	6.9	20.0	30.0	38	23.9	0.2	1.0	4.2	22.0	25.0	++	
O 21		L_2 anterior vertical diameter	52	25.2	0.2	1.8	7.0	22.0	31.0	33	24.5	0.2	1.1	4.7	23.0	27.0	+	+
O 22		L_3 anterior vertical diameter	56	25.2	0.2	1.6	6.6	22.0	29.0	35	25.1	0.2	1.3	5.2	22.0	28.0		
O 23		L_4 anterior vertical diameter	49	25.9	0.3	1.9	7.3	22.0	31.0	41	24.6	0.2	1.5	6.1	22.0	28.0		
O 24		L_5 anterior vertical diameter	51	25.8	0.3	1.9	7.5	23.0	31.0	34	24.9	0.3	1.6	6.6	21.0	29.0		+
S 2	Sacrum:	anterior direct length[1]	18	96.8	2.1	9.0	9.3	82.0	114.0	17	95.2	2.1	8.8	9.3	72.0	109.0		
S 2		anterior direct length[2]	12	113.8	1.8	6.4	5.6	101.0	122.0	1	110.0	0.0	0.0	0.0	110.0	110.0		
S 5		anterior upper direct breadth	33	104.7	0.8	4.6	4.4	92.0	115.0	22	104.8	1.4	6.7	6.4	93.0	113.0		
S 6		depth of concavity[1]	18	20.2	1.4	5.9	29.3	7.0	28.0	14	20.5	1.1	4.2	20.7	14.0	26.0		
S 6		depth of concavity[2]	12	23.8	1.6	5.6	23.5	15.0	31.0	4	17.5	3.4	6.8	38.6	10.0	26.0		
S 7		S_1 cranial transversal diameter	42	53.6	0.5	3.1	5.8	46.0	61.0	32	47.7	0.4	2.5	5.1	40.0	52.0		+
S 11		length / breadth i. (5:2)[1]	14	109.6	3.4	12.6	11.5	82.5	126.8	14	112.5	4.0	15.1	13.4	94.5	156.9		
S 11		length / breadth i. (5:2)[2]	11	92.6	2.2	7.1	7.7	85.0	108.9	1	98.2	0.0	0.0	0.0	98.2	98.2		
S 12		cord height i. (6:2)[1]	18	21.3	1.7	7.3	34.2	6.8	32.9	14	22.2	1.7	6.3	28.5	12.8	36.1		
S 12		cord height i. (6:2)[2]	12	20.9	1.3	4.6	22.2	14.0	27.2	1	23.6	0.0	0.0	0.0	23.6	23.6		
S 13		S_1 diam. / breadth i. (7:5)	33	51.5	0.5	3.2	6.1	45.4	60.6	22	46.0	0.6	3.0	6.5	41.5	53.2		+

No.	Bone	Measurement / Index	Males							Females							Test	
			n	$\bar{x}$	m	s	V	min.	max.	n	$\bar{x}$	m	s	V	min.	max.	F	t
P 1R	Os coxae	height – R	20	208.4	1.9	8.3	4.0	194.0	225.0	7	187.3	3.1	8.1	4.3	172.0	198.0		++
P 12R		ilium breadth – R	18	153.2	1.2	5.2	3.4	144.0	163.0	14	146.1	2.5	9.3	6.4	127.0	160.0	+	+
P 15R		ischium length[3] – R	36	106.0	0.8	4.8	4.6	90.0	117.0	21	93.8	0.9	3.9	4.2	87.0	99.0		++
P 17R		pubis length[4] – R	13	65.7	1.5	5.3	8.0	57.0	74.0	4	66.0	1.8	3.6	5.4	63.0	71.0		
P 18R		symphysis height – R	19	40.9	0.9	4.1	10.0	32.0	46.0	10	36.1	1.3	4.0	11.0	30.0	42.0		++
P 22R		acetabulum diameter – R	43	54.8	0.5	3.0	5.4	49.0	63.0	30	48.7	0.4	2.2	4.5	45.0	52.0		++
P 33		angulus subpubicus	22	61.1	1.7	8.2	13.3	50.0	80.0	10	84.5	2.2	6.9	8.1	80.0	100.0		+
P 1L		height – L	20	209.4	2.0	9.1	4.3	197.0	225.0	10	185.8	2.8	8.7	4.7	174.0	202.0		+
P 12L		ilium breadth – L	15	154.9	1.3	5.2	3.4	147.0	165.0	11	146.1	2.5	8.3	5.7	131.0	161.0		
P 15L		ischium length[3] – L	37	105.0	0.5	3.0	2.9	100.0	113.0	17	92.6	0.9	3.6	3.9	86.0	99.0		++
P 17L		pubis length[4] – L	15	65.8	1.7	6.6	10.1	54.0	76.0	5	68.0	2.6	5.9	8.7	59.0	73.0		
P 18L		symphysis height – L	23	40.6	0.7	3.3	8.0	32.0	48.0	6	35.2	1.2	2.9	8.1	31.0	39.0		++
P 22L		acetabulum diameter – L	47	54.3	0.3	2.3	4.2	49.0	59.0	26	47.5	0.5	2.4	5.0	43.0	53.0		++
P 41L		B/L i. (12:1) – L	14	74.4	0.8	3.0	4.1	69.4	81.0	6	76.8	1.6	4.0	5.2	70.8	82.9		
P 41R		B/L i. (12:1) – R	15	74.1	0.7	2.7	3.7	68.4	80.5	7	76.5	1.0	2.5	3.3	73.5	80.5		
P 42L		ischiopubic i. (17:15) – L	13	64.3	1.3	4.5	7.1	57.7	73.5	5	75.9	2.7	6.0	8.0	68.6	83.7		+
P 42R		ischiopublic i. (17:15) – R	11	62.6	1.0	3.2	5.2	57.7	67.3	4	71.0	1.8	3.6	5.0	67.4	74.7		++
P 43L		symph. / pub. i. (18:17) – L	13	61.4	1.8	6.6	10.8	52.5	73.3	5	52.1	3.1	6.8	13.1	45.8	62.7		
P 43R		symph. / pub. i. (18:17) – R	11	62.4	2.1	6.9	11.0	52.3	71.7	3	51.6	3.2	5.5	10.6	47.6	57.8		

Tab. 10:5 Measurements and Indices of the Upper Extremity

No.	Bone	Measurement / Index	Males							Females							Test	
			n	$\bar{x}$	m	s	V	min.	max.	n	$\bar{x}$	m	s	V	min.	max.	F	t
C 1R	Clavicle:	length – R	35	147.7	1.5	9.1	6.2	131.0	175.0	29	131.9	1.3	7.0	5.3	119.0	148.0		
C 6R		circumference – R	44	38.0	0.5	3.3	8.8	32.0	46.0	41	32.4	0.4	2.3	7.0	28.0	38.0	+	++
C 1L		length – L	28	144.8	1.4	7.2	5.0	134.0	161.0	32	131.6	1.3	7.2	5.5	119.0	150.0		
C 6L		circumference – L	39	37.9	0.5	2.9	7.7	32.0	46.0	42	32.0	0.4	2.3	7.1	27.0	36.0		++
C 11L		robusticity i. (6:1) – L	28	26.3	0.4	2.3	8.6	21.9	32.9	32	24.1	0.4	2.1	8.8	20.3	28.3		
C 11R		robusticity i. (6:1) – R	35	25.9	0.4	2.4	9.2	21.6	32.4	29	24.4	0.4	2.1	8.5	20.7	30.4		
H WR	Humerus:	weight – R	36	125.8	3.6	21.4	17.0	85.0	180.0	20	72.1	3.6	16.2	22.5	40.0	95.0		+
H 1R		length – R	37	320.7	2.6	15.8	4.9	285.0	346.0	20	292.5	2.7	12.3	4.2	270.0	313.0		++
H 7R		minim. circumf. – R	57	62.7	0.5	3.8	6.1	54.0	70.0	46	54.1	0.5	3.2	5.9	47.0	60.0		++
H 8R		caput circumf. – R	35	140.2	1.1	6.5	4.6	125.0	158.0	22	121.2	1.4	6.6	5.5	110.0	134.0		++
HWL		weight – L	29	121.1	3.6	19.1	15.8	90.0	175.0	21	68.8	3.5	16.1	23.4	40.0	95.0		++
H 1L		length – L	29	315.4	3.0	16.0	5.1	283.0	348.0	24	285.3	2.7	13.2	4.6	265.0	316.0		++
H 7L		minim. circumf. – L	49	62.4	0.5	3.5	5.6	55.0	70.0	46	54.1	0.5	3.1	5.7	47.0	60.0		++
H 8L		caput circumf. – L	31	138.2	1.1	6.2	4.5	125.0	156.0	24	121.0	1.1	5.5	4.5	107.0	132.0		++
H 11L		weight / length i. (W:1) – L	29	3.8	0.1	0.5	14.0	3.0	5.3	21	2.4	0.1	0.5	22.4	1.5	3.5		+
H 11R		weight / length i. (W:1) – R	36	3.9	0.1	0.6	15.3	2.7	5.4	20	2.5	0.1	0.6	23.2	1.4	3.4		+
H 12L		robusticity i. (7:1) – L	29	20.0	0.3	1.4	6.9	16.7	23.4	24	18.7	0.2	1.0	5.3	16.5	20.5		++
H 12R		robusticity i. (7:1) – R	37	19.6	0.2	1.4	7.0	16.7	22.8	20	18.3	0.2	0.9	5.0	16.1	19.8		++
H 13L		caput / length i. (8:1) – L	29	43.9	0.4	2.1	4.8	39.7	47.8	21	42.2	0.5	2.3	5.6	38.5	47.4		
H 13R		caput / length i. (8:1) – R	33	44.0	0.4	2.1	4.9	40.4	48.1	17	41.5	0.4	1.8	4.4	38.5	44.4		
R WR	Radius:	weight – R	31	40.1	1.4	7.5	18.8	30.0	65.0	14	23.1	1.1	4.0	17.3	15.0	30.0	+	+
R 1R		length – R	34	245.3	2.0	11.8	4.8	228.0	271.0	16	218.8	3.1	12.4	5.7	198.0	247.0		+
R 3R		minim. circumference – R	47	41.8	0.4	3.0	7.2	36.0	49.0	43	35.6	0.4	2.4	6.7	30.0	41.0		++
R WL		weight – L	31	40.0	1.2	6.8	17.1	30.0	55.0	22	23.7	0.9	4.4	18.4	20.0	30.0	+	++
R 1L		length – L	31	246.4	2.2	12.1	4.9	227.0	272.0	22	217.2	2.0	9.3	4.3	193.0	233.0		++
R 3L		minim. circumference – L	47	41.8	0.4	2.9	6.9	36.0	49.0	44	34.8	0.4	2.3	6.7	30.0	41.0		++
R 11L		weight / length i. (W:1) – L	30	1.6	0.0	0.3	16.2	1.2	2.2	22	1.1	0.0	0.2	19.2	0.9	1.4		+
R 11R		weight / length i. (W:1) – R	31	1.6	0.0	0.3	16.2	1.2	2.5	14	1.0	0.0	0.2	17.0	0.7	1.4		++
R 12L		robusticity i. (3:1) – L	30	16.8	0.3	1.4	8.5	13.8	19.9	22	15.9	0.2	1.0	6.2	14.4	18.2		
R 12R		robusticity i. (3:1) – R	34	17.1	0.2	1.3	7.6	14.2	19.9	15	16.3	0.3	1.3	8.8	13.7	18.2		
U WR	Ulna:	weight – R	29	52.7	2.0	10.7	20.4	40.0	80.0	12	27.5	1.9	6.6	23.9	20.0	40.0		++
U 1R		length – R	28	266.6	2.3	12.4	4.6	246.0	290.0	14	241.1	2.4	8.9	3.7	217.0	253.0		+
U 3R		minim. circumf. – R	37	37.3	0.5	3.1	8.3	31.0	46.0	29	31.3	0.5	2.4	7.8	26.0	36.0		+
U WL		weight – L	24	51.0	1.8	8.9	17.4	35.0	65.0	18	27.8	1.0	4.3	15.4	20.0	35.0	++	++
U 1L		length - L	24	267.2	2.8	13.7	5.1	245.0	290.0	17	234.9	2.2	9.3	3.9	211.0	255.0		++
U 3L		minim. circumf. – L	36	36.6	0.5	2.9	8.0	32.0	45.0	29	30.6	0.4	2.0	6.4	27.0	35.0	+	++
U 11L		weight / length i. (W:1) – L	23	1.9	0.1	0.3	15.4	1.4	2.4	17	1.2	0.0	0.2	14.2	0.8	1.5	+	+
U 11R		weight / length i. (W:1) – R	28	2.0	0.1	0.4	19.1	1.5	2.9	12	1.1	0.1	0.3	21.8	0.8	1.6		+
U 12L		robusticity i. (3:1) – L	24	13.7	0.2	1.0	7.5	12.0	16.1	17	13.1	0.2	0.8	5.8	11.8	14.7		
U 12R		robusticity i. (3:1) – R	25	14.1	0.2	1.1	8.0	11.5	16.3	14	13.0	0.3	0.9	7.3	11.2	14.8		++

Explanations for tables 10:4–6:

No. = number of measurement according to Martin and Saller (1957), symbol of measurement or number of index according to the present author

$\underline{n}$ = number of cases

$\bar{x}$ = arithmetic mean

m = standard error of the mean $(\frac{s}{\sqrt{n}})$

s = standard deviation $(\frac{(x_i-\bar{x})^2}{n-1})$

V = variation coefficient $(\frac{s}{\bar{x}}.100)$

min. = minimum value

max. = maximum value

i. = index

L = left

R = right

1 = five-piece sacrum

2 = six-piece sacrum

3 = including acetabulum diameter

4 = without acetabulum diameter

Tab. 10:6 Measurements and Indices of the Lower Extremity

No.	Bone	Measurement / Index	Males							Females							Test	
			n	x̄	m	s	V	min.	max.	n	x̄	m	s	V	min.	max.	F	t
F WR	Femur:	weight – R	37	337.0	8.5	51.6	15.3	225.0	450.0	21	204.0	8.3	38.2	18.7	125.0	265.0		++
F 1R		max. length – R	36	442.1	4.0	23.8	5.4	399.0	504.0	19	409.5	5.0	21.9	5.3	376.0	441.0		++
F 2R		physiol. length – R	37	438.6	3.8	23.0	5.3	394.0	503.0	21	403.5	4.8	22.0	5.4	373.0	437.0		+
F 6R		midshaft a. – p. diam. – R	58	28.8	0.4	2.8	9.6	23.0	35.0	47	24.8	0.2	1.6	6.5	21.0	29.0	++	+
F 7R		midshaft trans. diam. – R	58	26.5	0.3	2.0	7.4	22.0	32.0	47	23.5	0.2	1.3	5.7	21.0	26.0	++	+
F 9R		subtroch. trans. diam. – R	55	31.1	0.3	2.4	7.7	26.0	41.0	46	28.1	0.3	1.7	6.1	25.0	33.0	+	+
F 10R		subtroch. a. – p. diam. – R	55	24.5	0.3	2.1	8.4	20.0	29.0	46	21.4	0.2	1.1	5.4	19.0	25.0	+	++
F 20R		caput circumference – R	43	145.7	1.1	7.2	4.9	133.0	164.0	38	127.2	1.0	6.1	4.8	115.0	140.0		++
F WL		weight – L	37	338.9	8.1	49.0	14.5	225.0	445.0	27	214.3	6.7	34.7	16.2	140.0	275.0		++
F 1L		max. length – L	38	444.1	3.9	23.7	5.3	404.0	509.0	25	408.6	4.0	19.9	4.9	372.0	452.0		++
F 2L		physiol. length – L	39	441.3	3.7	23.3	5.3	402.0	505.0	27	404.0	3.7	19.2	4.8	368.0	448.0		
F 6L		midshaft a. – p. diam. – L	59	29.0	0.4	3.0	10.4	23.0	36.0	49	25.1	0.2	1.7	6.7	22.0	29.0	++	
F 7L		midshaft trans. diam. – L	59	27.4	0.3	2.0	7.5	23.0	33.0	50	24.5	0.2	1.5	6.0	22.0	28.0	+	+
F 9L		subtroch. trans. diam.	58	31.9	0.3	2.5	7.9	27.0	39.0	51	28.1	0.2	1.7	6.0	25.0	32.0	++	+
F 10L		subtroch. a. – p. diam. – L	57	24.5	0.3	2.0	8.0	20.0	30.0	51	21.7	0.2	1.6	7.6	18.0	25.0		
F 20L		caput circumference – L	50	145.4	1.0	7.1	4.9	132.0	163.0	38	126.2	0.8	4.8	3.8	117.0	136.0	+	++
F 21L		weight / length i. (W:1) – L	36	7.6	0.2	1.0	13.7	5.1	9.8	24	5.3	0.2	0.9	17.0	3.2	6.5		+
F 21R		weight / length i. (W:1) – R	34	7.7	0.2	1.0	13.3	5.6	9.6	19	5.1	0.2	0.8	16.5	3.2	6.3		++
F 22L		robusticity i. (6 + 7:2) – L	39	12.8	0.1	0.8	6.5	10.9	15.1	26	12.2	0.1	0.5	4.2	10.8	12.9	+	++
F 22R		robusticity i. (6 + 7:2) – R	37	12.6	0.1	0.8	6.5	10.7	14.2	21	11.8	0.1	0.6	5.1	10.5	12.6	++	++
F 23L		i. pilastricus (6:7) – L	59	106.7	1.8	13.5	12.6	76.7	140.0	49	103.0	1.0	7.3	7.1	84.6	117.4	++	
F 23R		i. pilastricus (6:7) – R	58	109.0	1.6	12.1	11.1	82.1	152.2	47	105.7	1.3	8.7	8.3	88.0	126.1	+	
F 24L		i. platymericus (10:9) – L	57	77.3	1.0	7.5	9.7	65.7	100.0	51	77.4	1.0	7.1	9.2	63.3	92.3		
F 24R		i. platymericus (10:9) – R	55	79.0	1.0	7.1	9.0	64.7	96.6	46	76.4	0.8	5.1	6.7	66.7	88.9	+	+
F 25L		caput / length i. (20:1) – L	35	32.7	0.3	1.5	4.6	28.9	36.5	24	30.7	0.2	1.0	3.4	28.8	32.5		++
F 25R		caput / length i. (20:1) – R	34	33.1	0.3	1.6	4.8	29.0	36.7	18	31.1	0.3	1.1	3.7	28.9	32.9		
WR	Tibia:	weight – R	26	200.2	5.1	25.8	12.9	140.0	250.0	29	120.7	5.4	29.1	24.1	65.0	180.0		+
T 1R		length – R	26	369.6	3.5	17.9	4.8	334.0	401.0	28	333.7	3.1	16.6	5.0	303.0	365.0		+
T 8AR		a. – p. diam. at for. nutr. – R	51	34.4	0.3	2.4	6.9	30.0	39.0	44	29.4	0.3	1.8	6.0	26.0	33.0	+	++
T 9AR		trans. diam. at for. nutr. – R	51	23.7	0.3	1.9	8.1	20.0	28.0	45	20.6	0.2	1.4	7.0	17.0	24.0		
T 10BR		minim. circumference – R	49	75.7	0.6	4.5	6.0	68.0	91.0	45	65.3	0.6	3.9	5.9	58.0	76.0		++
T WL		weight – L	39	201.8	4.7	29.1	14.4	135.0	275.0	27	120.6	4.6	23.8	19.7	65.0	150.0		++
T 1L		length – L	41	367.1	3.1	20.0	5.5	326.0	408.0	27	334.1	3.3	17.0	5.1	304.0	361.0		
T 8AL		a. – p – diam. at for. nutr. – L	54	35.0	0.3	2.4	6.8	30.0	40.0	40	29.4	0.3	1.8	6.1	26.0	33.0		++
T 9AL		trans. diam. at for. nutr. – L	54	23.3	0.3	1.9	8.0	20.0	27.0	40	20.4	0.3	1.6	7.9	17.0	23.0		+
T 10BR		minim. circumference – L	52	75.3	0.6	4.5	6.0	67.0	91.0	40	64.3	0.5	3.5	5.4	55.0	70.0		++
T 11L		weight / length i. (W:1) – L	39	5.5	0.1	0.7	13.2	3.7	7.1	27	3.6	0.1	0.7	19.1	2.1	4.7		++
T 11R		weight / length i. (W:1) – R	25	5.4	0.1	0.6	11.1	4.2	6.6	28	3.6	0.2	0.8	22.0	2.1	5.2		++
T 12L		i. cnemicus (9A:8A) – L	53	66.9	0.8	6.0	9.0	51.3	78.1	40	69.4	0.8	5.3	7.6	54.5	78.6		+
T 12R		i. cnemicus (9A:8A) – R	51	69.1	0.9	6.3	9.1	51.3	80.6	44	70.5	0.8	5.0	7.1	58.6	82.1		
T 13L		robusticity i. (10B:1) – L	40	20.4	0.2	1.3	6.3	18.4	23.5	27	19.1	0.2	1.0	5.2	17.1	20.8		++
T 13R		robusticity i. (10B:1) – R	26	20.4	0.2	1.0	4.8	18.8	22.2	28	19.4	0.2	0.9	4.8	17.6	21.2		
V WR	Fibula:	weight – R	20	45.8	1.5	6.5	14.3	35.0	60.0	14	31.8	1.7	6.4	20.1	20.0	40.0		+
V 1R		length –R	19	347.2	4.5	19.5	5.6	311.0	376.0	14	323.1	3.4	12.7	3.9	289.0	336.0		++
V 4AR		minim. circumference – R	37	33.5	0.5	3.3	9.8	28.0	42.0	34	31.3	0.5	3.0	9.7	24.0	36.0		++
V WL		weight – L	12	42.9	2.0	6.9	16.1	35.0	55.0	14	31.4	1.5	5.7	18.1	20.0	40.0		
V 1L		length – L	12	349.9	5.1	17.8	5.1	323.0	379.0	14	330.1	3.5	13.0	3.9	304.0	349.0		
V 4AL		minim. circumference – L	33	34.0	0.6	3.6	10.6	28.0	43.0	40	30.5	0.4	2.7	8.9	24.0	36.0		++
V 11L		weight / length i. (W:1) – L	11	1.2	0.1	0.2	17.1	1.0	1.6	14	1.0	0.0	0.2	18.2	0.7	1.2		++
V 11R		weight / length i. (W:1) – R	19	1.3	0.0	10.2	14.4	1.1	1.8	14	1.0	0.0	0.2	18.6	0.7	1.3		++
V 12L		robusticity i. (4A:1) – L	12	9.6	0.3	1.0	10.8	8.1	11.4	13	9.3	0.2	0.8	8.4	7.6	10.6		
V 12R		robusticity i. (4A:1) – R	18	9.8	0.2	1.0	10.0	8.2	11.6	14	9.6	0.2	0.9	9.4	8.2	11.0		
X 1R	Patela:	length – R	32	42.3	0.6	3.3	7.8	36.0	55.0	26	36.5	0.5	2.4	6.7	32.0	41.0		+
X 1L		length – L	23	41.6	0.6	3.0	7.3	36.0	51.0	29	36.9	0.4	2.4	6.5	32.0	41.0		
Y 1R	Talus:	length – R	49	57.2	0.5	3.2	5.5	50.0	64.0	46	50.6	0.4	2.7	5.4	45.0	57.0		++
Y 1L		length – L	34	56.9	0.6	3.4	6.0	50.0	64.0	43	50.2	0.4	2.5	5.0	45.0	56.0		++
Z 1RP	Calcaneus:	length – R	42	76.7	0.7	4.6	6.0	67.0	86.0	37	70.4	0.5	3.0	4.3	64.0	76.0	+	+
Z 1L		length – L	38	77.2	0.8	4.7	6.1	68.0	87.0	37	70.1	0.5	2.8	4.0	64.0	76.0	++	+

Tab. 10:7 Proportional Indices+

No.	Index	Side	Males n	Males x̄	Males m	Males s	Males min.	Males max.	Females n	Females x̄	Females m	Females s	Females min.	Females max.	Test F	Test t
B 1	Humero-clavicular (C 1:H 1)	R	16	45.78	0.67	2.69	41.57	50.34	11	45.99	0.32	1.06	43.90	47.74	++	-
		L	10	45.52	0.77	2.44	42.30	50.18	9	45.74	0.65	1.95	42.25	48.58	-	-
B 2	Humero-radial (brachial) (R 1:H 1)	R	10	77.17	0.70	2.20	73.31	80.07	4	74.07	1.67	3.34	69.96	78.13	-	-
		L	12	77.98	0.56	1.95	74.75	81.73	9	75.91	0.54	1.61	72.83	78.37	-	+
B 3	Femoro-tibial (crural) (T 1++:F 2)	R	10	83.17	0.74	2.35	79.72	85.87	15	82.51	0.57	2.21	79.02	86.89	-	-
		L	16	82.53	0.49	1.97	79.43	86.33	14	81.68	0.77	2.87	77.83	85.82	-	-
B 4	Femoro-humeral (H 1++:F 2)	R	13	72.29	0.55	2.00	68.79	75.66	12	71.81	0.62	2.15	67.91	75.87	-	-
		L	11	71.61	0.41	1.35	70.05	74.28	10	70.28	0.86	2.71	65.67	75.00	+	-
B 5	Tibio-radial (R 1:T 1)	R	7	67.49.	0.68	1,81	64.99	70.21	8	65.46	0.60	1.69	63.46	68.75	-	+
		L	14	67.36	0.51	1.92	64.24	71.69	10	64.78	0.61	1.94	62.61	69.04	-	-
B 6	Intermembral (H 1 + R 1):(F 2 + T 1)	R	4	70.55	0.78	1.55	69.16	72.78	4	68.68	0.56	1.13	67.57	70.22	-	-
		L	6	70.18	0.51	1.25	68.98	71.95	6	67.37	0.50	1.23	65.76	68.89	-	+

Explanations:
+ = according to the second series
No. = number according to the present author
++ = modificattion by the present author
n = number of cases
x̄ = arithmetic mean
m = standard error of the mean
s = standard deviation
min. = minimum
max. = maximum
R = right
L = left

Tab. 10:8 Reconstruction of Stature (cm) according to Equations for Whites

Method	Reconstruction according to		First series Males n	Males x̄	Males s/R	Females n	Females x̄	Females s/R	Test F	Test t	Second series Males n	Males x̄	Males s/R	Females n	Females x̄	Females s/R	Test F	Test t
Dupertius and Hadden (1951)	Humerus	R	19	171.33	3.68	5	157.06	4.98	-	+	18	170.94	3.57	15	157.78	4.13	-	++
		L	12	170.58	4.36	10	155.82	5.67	-	+	17	169.47	3.05	14	154.60	3.68	-	++
	Radius	R	17	173.75	4.21	6	162.55	5.98	-	++	17	173.22	4.01	10	160.72	5.05	-	++
		L	12	173.70	4.63	6	159.57	4.55	-	+	19	173.98	3.99	16	161.17	3.75	-	++
	Femur	R	21	171.05	4.32	5	157.65	6.23	-	+	15	169.98	6.01	14	158.06	4.88	-	++
		L	21	171.02	5.09	10	156.68	3.83	-	++	17	171.01	5.10	15	158.44	5.09	-	+
	Tibia	R	12	173.28	3.75	7	161.09	5.23	-	++	14	173.26	4.15	21	159.08	4.06	-	++
		L	20	173.17	4.66	10	160.42	4.45	-	+	21	172.31	4.12	17	159.24	4.59	-	+
	Total weighted means		134	172.14	162.53-182.00	59	158.70	149.95-173.41			138	171.81	161.48-184.75	122	158.64	148.10-167.83		
	Total unweigh. means		8	172.24		8	158.86				8	171.77		8	158.64			
Trotter and Gleser (1952)	Humerus	R	19	169.48	4.99	5	155.75	4.85	-	+	18	168.96	4.85	15	156.44	4.02	-	++
		L	12	168.47	5.92	10	154.54	5.52	-	+	17	166.96	4.14	14	153.35	3.58	-	++
	Radius	R	17	172.02	4.61	6	159.22	6.66	-	++	17	171.44	4.39	10	157.88	5.62	-	++
		L	12	171.97	5.07	6	156.60	5.06	-	+	19	172.28	4.37	16	158.38	4.18	-	++
	Ulna	R	13	173.12	4.77	4	161.63	2.10	-	++	15	172.35	4.54	10	160.37	4.37	-	++
		L	9	173.25	5.47	3	156.40	1.86	-	+	15	172.69	5.00	14	158.44	4.23	-	++
	Femur	R	21	167.14	4.85	5	154.93	6.63	-	-	15	165.94	6.76	14	155.35	5.19	-	++
		L	21	167.11	5.72	10	153.89	4.07	-	++	17	167.10	5.74	15	155.76	5.41	-	+
	Tibia	R	12	171.78	4.33	7	159.96	5.76	-	++	14	171.75	4.80	21	157.75	4.46	-	++
		L	20	171.65	5.40	10	159.23	4.90	-	+	21	170.66	4.77	17	157.93	5.05	-	+
	Fibula	R	11	163.85	5.66	2	152.64	2.69	-	+	8	166.15	4.55	12	154.54	3.90	-	+
		L	5	165.31	5.38	6	156.64	4.56	-	+	7	165.74	4.74	8	156.08	3.42	-	++
	Total weighted means		172	169.66	155.13-181.44	74	156.89	146.72-172.01			183	169.67	157.61-182.55	166	156.87	145.98-166.64		
	Total unweigh. means		12	169.60		12	156.84				12	169.34		12	156.86			

Tab. 10:9 Reconstruction of Stature (cm) according to Equations for Negroes

Method	Reconstruction according to		First series							Second series						
			Males			Females			Test	Males			Females			Test
			n	x̄	s/R	n	x̄	s/R	F t	n	x̄	s/R	n	x̄	s/R	F t
Dupertius and Hadden (1951)	Humerus	R	19	169.52	6.01	5	158.29	4.38	- -·	18	168.89	5.84	15	158.92	3.63	- ++
		L	12	168.30	7.14	10	157.20	4.99	- -·	17	166.48	4.98	14	156.13	3.24	- ++
	Radius	R	17	168.58	4.93	6	158.21	5.28	- ++	17	167.96	4.69	10	156.60	4.46	- ++
		L	12	168.52	5.42	6	155.58	4.01	- +	19	168.85	4.67	16	156.99	3.32	- ++
	Femur	R	21	167.86	5.18	5	156.20	6.70	- -·	15	166.58	7.21	14	156.64	5.25	- ++
		L	21	167.82	6.10	10	155.15	4.12	- ++	17	167.81	6.13	15	157.05	5.47	- -·
	Tibia	R	12	168.75	4.50	7	157.96	5.01	- ++	14	168.73	4.98	21	156.04	3.88	- ++
		L	20	168.62	5.60	10	157.32	4.26	- +	21	167.59	4.95	17	156.19	4.39	- +
	Total weighted means		134	168.47	157.34-181.00	59	156.91	147.91-167.80		138	167.87	155.23-184.31	122	156.79	147.16-167.14	
	Total unweigh. means		8	168.49		8	156.99			8	167.86		8	156.82		
Trotter and Gleser (1952)	Humerus	R	19	166.92	5.28	5	154.30	4.45	- +	18	166.36	5.13	15	154.93	3.68	- ++
		L	12	165.85	6.27	10	153.19	5.06	- +	17	164.25	4.38	14	152.10	3.29	- ++
	Radius	R	17	165.71	4.17	6	155.42	3.86	- ++	17	165.19	3.97	10	154.24	3.26	- ++
		L	12	165.66	4.59	6	153.50	2.93	- +	19	165.94	3.95	16	154.53	2.43	- ++
	Ulna	R	13	166.58	4.20	4	155.90	1.63	- ++	15	165.90	4.00	10	154.92	3.39	- ++
		L	9	166.69	4.82	3	151.84	1.44	- +	15	166.20	4.40	14	153.42	3.28	- ++
	Femur	R	21	164.08	4.31	5	152.83	6.12	- -·	15	163.02	5.99	14	153.22	4.79	- ++
		L	21	164.05	5.07	10	151.87	3.76	- ++	17	164.05	5.09	15	153.61	5.00	- +
	Tibia	R	12	166.98	3.77	7	155.81	4.86	- ++	14	166.96	4.17	21	153.94	3.77	- ++
		L	20	166.86	4.69	10	155.19	4.14	- +	21	166.06	4.14	17	154.09	4.26	- +
	Fibula	R	11	160.89	4.62.	2	149.96	2.29	- ++	8	162.76	3.72	12	151.57	3.31	- +
		L	5	162.08	4.40	6	153.36	3.88	- ++	7	162.42	3.88	8	152.88	2.91	- ++
	Total weighted means		172	165.37	153.76-175.55	74	153.80	145.26-162.43		183	165.18	154.36-177.75	166	153.67	142.86-162.82	
	Total unweigh. means		12	165.20		12	153.60			12	164.93		12	153.62		

Explanations for Tab. 10:8 and 10:9 :
n = number of cases
x̄ = arithmetic mean
s/R = standard deviation or range (minimum — maximum)
R = right
L = left
- = intersexual difference not significant
-· = intersexual difference near to the treshold of significancy (p = 0.05)
+ = intersexual difference significant (p = 0.05)
++ = intersexual difference highly significant (p = 0.01)

Tab. 10:10 Comparison of the Reconstructed Stature with Living Statures of the Same Area

Locality	Method / Literature	Males			Females		
		n	x̄	R/±3s	n	x̄	R
Abusir, secondary cemetery in the mastaba of Ptahshepses, both series	Dupertius and Hadden (1951) — Whites	272	171.97	161.48—184.75	181	158.66	148.10—173.41
	Trotter and Gleser (1952) — Whites	355	169.67	155.13—182.55	240	156.88	145.98—172.01
	Dupertius and Hadden (1951) — Negroes	272	168.17	155.23—184.31	181	156.83	147.16—167.80
	Trotter and Gleser (1952) — Negroes	355	165.27	153.76—177.75	240	153.71	142.86—162.82
Abusir, recent living	Strouhal and Reisenauer (1963)	64	165.81	152.50—184.00	-	-	-
Giza, recent living	Craig (1911)	326	167.80	150.16—185.44	-	-	-
Beni Suef, recent living	Craig (1911)	384	166.23	148.50—183.96	-	-	-

Explanations: n = number
x̄ = arithmetic mean
R = range
±3s = interval from minus to plus three standard deviations (in recent series)

Tab. 11:1 Descriptive Morphological Features of the Skull — Frontal Norm

Norm	—	Frontal norm											
Feature	Skull robusticity N = 62,60	Tubera frontalia N = 44,44	Special shape of the frontal scale N = 44,44	Orbit: Form N = 21,15	Orbit: Axis N = 21,15	Orbit: Upper margin N = 46,46	Shape of the nasal bones N = 21,16	Apertura piriformis: Shape N = 27,23	Apertura piriformis: Lower margin N = 46,40	Apertura piriformis: Lower margin N = 46,39	Depth of the fossae caninae N = 35,34	Development of the processus marginales N = 38,37
Division	1—slight 2—medium 3—big 4—very big	1—slight 2—medium 3—big	B—front bombé C—crista frontalis Ø—no	1—square 2—rectangular 3—trapezoid	1—horizontal 2—slightly oblique 3—oblique	1—thin 2—medium 3—thick	Hovorka in: Martin-Saller (1959)	1—triangular 2—narrow oval 3—cordiform 4—circular	Martin-Saller (1959)	C—crest A—angle S—smooth	1—slight 2—medium 3—big	0—no 1—slight 2—medium 3—big
	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %
Males	1 — — 1—2 1 1.6 2 22 35.5 2—3 15 24.2 3 19 30.6 4 5 8.1	1 22 50.0 2 17 38.6 3 5 11.4	(B) 6 13.6 B 8 18.2 (C) 3 6.8 C 3 6.8 Ø 24 54.5	1 5 23.8 2 13 61.9 3 3 14.3	1 4 19.0 2 10 47.6 3 7 33.3	1 3 6.5 1—2 9 19.6 2 21 45.7 2—3 6 13.0 3 7 15.2	1 14 66.7 2 5 23.8 3 2 9.5	1 — — 2 4 14.8 3 20 74.1 4 3 11.1	1 — — 2 4 8.7 3 36 78.3 4 6 13.0	C 29 63.0 A 8 17.4 S 5 10.9 A/S 4 8.7	1 1 2.9 2 21 60.0 3 13 37.1	0 9 23.7 1 12 31.6 2 14 36.8 3 3 7.9
Females	1 23 38.3 1—2 10 16.7 2 21 35.0 2—3 6 10.0 3 — — 4 —	1 8 18.2 2 28 63.6 3 8 18.2	(B) 9 20.5 B 13 29.5 (C) 5 11.4 C — — Ø 17 38.6	1 4 26.7 2 7 46.7 3 4 26.7	1 5 33.3 2 7 46.7 3 3 20.0	1 28 60.9 1—2 8 17.4 2 10 21.7 2—3 — — 3 — —	1 6 37.5 2 10 62.5 3 — —	1 1 4.3 2 4 17.4 3 17 73.9 4 1 4.3	1 — — 2 1 2.5 3 35 87.5 4 4 10.0	C 25 64.1 A 10 25.6 S 2 5.1 A/S 2 5.1	1 6 17.6 2 13 38.2 3 15 44.1	0 9 24.3 1 21 56.8 2 5 13.5 3 2 5.4

Explanations for Tables 11:1—3
N = total number of males and females used for analysis of the feature
D = degree or category
n = number of cases
% = per cent
( ) = feature in brackets = slightly developed

Tab. 11:2 Descriptive Morphological Features of the Skull — Lateral Norm

Norm	Lateral norm													
Feature	Development of the spina nasalis N = 39,27	Upper/lower profile of the nasal back N = 27,17	Nasofrontal transition N = 28,19	Arcus superciliares N = 44,41	Glabella N = 41,39	Profile of the frontal scale N = 43,41	Profile of the postbregmatic region N = 46,45	Obelic flatness N = 49,44	Lambda flatness N = 48,44	Bulge of the occipital scale N = 47,46	External occipital protuberance N = 46,44	Prominence of the zygomatic bones N = 20,15	Lineae temporales N = 46,43	Cristae supramas-toideae N = 53,50
Division	Broca in: Martin—Saller (1959)	cc—concave cv—convex s—straight a—angular	1—straight 2—slight arch 3—deep arch 4—very obtuse angle 5—obtuse angle 6—right angle	Eickstedt (1944)	Broca in: Martin-Saller (1959)	1—perpendicular 2—medium 3—oblique 4—well arched	h—horizontal cv—convex cc—concave a—ascending d—descending	0—no 1—slight 2—medium 3—large, combined with lambda flatness	0—no 1—slight 2—medium 3—large, combined with obelic flatness	0—no 1—slight 2—medium 3—big	Broca in: Martin-Saller (1959)	0—no 1—slight 2—medium 3—big	0—no 1—slight-frontal 2—slight-frontal and parietal 3-medium-frontal 4-medium-frontal and parietal	0—no 1-slight 2-medium 3-large
	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %
Males	1 3 7.7 2 17 43.6 3 13 33.3 4 6 15.4	cc/cv 10 37.0 cc/s 1 3.7 cc/— 10 37.0 s/s 2 7.4 s/cv 1 3.7 s/— 2 7.4 a 1 3.7	1 1 3.6 2 2 7.1 3 1 3.6 4 10 35.7 5 13 46.4 6 1 3.6	1 — — 1—2 — — 2 4 9.1 2—3 5 11.4 3 14 31.8 3—4 9 20.5 4 9 20.5 5 3 6.8	1 — 1—2 — 2 5 12.2 2—3 11 26.8 3 16 39.0 3—4 6 14.6 4 2 4.9 4—5 1 2.4	1 4 9.3 2 14 32.6 3 19 44.2 4 6 14.0	h 28 60.9 cv 3 6.5 cc 7 15.2 a 6 13.0 d 2 4.3	0 25 51.0 1 12 24.5 2 5 10.2 3 7 14.3	0 5 10.4 1 20 41.7 2 16 33.3 3 7 14.6	0 3 6.4 1 26 55.3 2 16 34.0 3 2 4.3	0 1 2.2 1 15 32.5 2 22 47.8 3 8 17.4	0 14 70.0 1 5 25.0 2 1 5.0 3 — —	0 2 4.3 1 21 45.7 2 8 17.4 3 9 19.6 4 6 13.0	0 — — 1 1 1.9 2 25 47.2 3 27 50.9
Females	1 4 14.8 2 15 55.6 3 5 18.5 4 3 11.1	cc/cv 5 29.4 cc/s 3 17.6 cc/— 6 35.3 s/s — — s/cv 1 5.9 s/— 2 11.8 a — —	1 4 21.1 2 8 42.1 3 — — 4 6 31.6 5 1 5.3 6 — —	1 11 26.8 1—2 13 31.7 2 13 31.7 2—3 4 9.8 3 — — 3—4 — — 4 — — 5 — —	1 14 35.9 1—2 12 30.8 2 12 30.8 2—3 1 2.6 3 — — 3—4 — — 4 — — 4—5 — —	1 21 51.2 2 10 24.4 3 6 14.6 4 4 9.8	h 20 44.4 cv 6 13.3 cc 8 17.8 a 11 24.4 d — —	0 22 50.0 1 15 34.1 2 5 11.4 3 2 4.5	0 9 20.5 1 22 50.0 2 11 25.0 3 2 4.5	0 3 6.5 1 24 52.2 2 18 39.1 3 1 2.2	0 15 34.1 1 22 50.0 2 7 15.9 3 — —	0 7 46.7 1 6 40.4 2 2 13.3 3 — —	0 2 4.7 1 22 51.2 2 9 20.9 3 6 14.0 4 4 9.3	0 2 4.0 1 28 56.0 2 19 38.0 3 1 2.0

Tab. 11:3 Descriptive Morphological Features of the Skull — Other Norms and Mandible

Norm	Vertical norm		Occipital norm			Basal norm		Mandible						
Feature	Outline N = 39,38	Tubera parietalia N = 48,45	Outline N = 46,29	Special shape of the sagittal region N = 47,42	Muscular relief on the nuchal plane N = 48,47	Shape of the upper dental arch N = 39,34	Depth of the palate N = 48,39	Robusticity N = 54,54	Muscular relief N = 50,50	Gonial eversion and inversion N = 50,50	Shape of the lower dental arch N = 47,45	Chin form N = 50,47	Chin prominence N = 46,46	Occlusion N = 35,25
Division	Sergi in: Martin-Saller (1959)	1 — slight 2 — medium 3 — big	1 — house shape 2 — transitory 1 — 3 3 — tent shape 4 — bomb shape 5 — transitory 1 — 4	S — sulcus sagittalis C — crista sagittalis Ø — no	0 — no 1 — slight 2 — medium 3 — outstanding	E — ellipsoid P — parabolic A — angulated, diverging sides U — romanesque arch	1 — slight 2 — medium 3 — big A — lowered by atrophy	1 — slight 2 — medium 3 — big 4 — very big A — lowered by atrophy	1 — slight 2 — medium 3 — outstanding 4 — very outstanding	E — eversion I — inversion Ø — no	E — ellipsoid P — parabolic A — angulated, diverging sides U — romanesque arch	De Villiers (1968)	0 — no 1 — slight 2 — medium 3 — big A — augmented by atrophy	L — labidodontic P — psalidodontic
	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %	D n %
Males	1 3 7.7 2 16 41.0 3 2 5.1 4 — — 5 10 25.6 6 5 12.8 7 3 7.7	1 14 29.2 2 25 52.1 3 9 18.8	1 24 52.2 2 12 26.1 3 — — 4 7 15.2 5 3 6.5	(S) 13 27.7 S 2 4.3 (C) 6 12.8 C 1 2.1 Ø 25 53.2	0 — — 0—1 — — 1 1 2.1 1—2 6 12.5 2 25 52.1 2—3 6 12.5 3 10 20.8	E 27 69.2 P 3 7.7 A 9 23.1 U — —	1 — — 2 26 54.2 3 11 22.9 A 11 22.9	1 — 1—2 1 1.9 2 13 24.1 2—3 11 20.4 3 23 42.6 4 3 5.6 A 3 5.6	1 — — 1—2 — — 2 7 14.0 2—3 12 24.0 3 27 54.0 4 4 8.0	(E) 16 32.0 E 26 52.0 (I) — — Ø 8 16.0	E 9 19.1 P 29 61.7 A 7 14.9 U 2 4.3	1 7 14.0 2 9 18.0 3 11 22.0 4 22 44.0 5 1 2.0 6 — —	0 1 2.2 1 10 21.7 2 17 37.0 3 16 34.8 A 2 4.3	L 34 97.1 P 1 2.9
Females	1 1 2.6 2 18 47.4 3 3 7.9 4 — — 5 12 31.6 6 3 7.9 7 1 2.6	1 10 22.2 2 17 37.8 3 18 40.0	1 16 55.2 2 5 17.2 3 1 3.4 4 5 17.2 5 2 6.9	(S) 8 19.0 S — — (C) 4 9.5 C 2 4.8 Ø 28 66.7	0 — — 0—1 8 17.0 1 22 46.8 1—2 7 14.9 2 9 19.1 2—3 1 2.1 3 — —	E 23 67.6 P 6 17.6 A 3 8.8 U 2 5.9	1 3 7.7 2 20 51.3 3 12 30.8 A 4 10.3	1 21 38.9 1—2 9 16.7 2 14 25.9 2—3 6 11.1 3 — — A 4 7.4	1 9 18.0 1—2 12 24.0 2 20 40.0 2—3 9 18.0 3 — —	(E) 13 26.0 E 3 6.0 (I) 2 4.0 I 6 12.0 Ø 26 52.0	E 6 13.3 P 35 77.8 A 4 8.9 U — —	1 3 6.4 2 13 27.7 3 — — 4 1 2.1 5 23 48.9 6 7 14.9	0 — — 1 2 4.3 2 18 39.1 3 24 52.2 A 2 4.3	L 23 92.0 P 2 8.0

Tab. 11:4 Epigenetic Features of the Skull

Feature	Males+			Females+			Adults and juveniles+			Children++		
	n	N	%	n	N	%	n	N	%	n	N	%
Metopism (6)	3	52	5.8	7	44	15.9	10	96	10.4	2*	69	2.9
Coronal ossicle (7)	25	49	51.0	19	37	51.4	44	86	51.2	0	26	0.0
Bregmatic bone (5)	0	48	0.0	0	39	0.0	0	87	0.0	0	29	0.0
Sagittal ossicle	13	44	29.5	8	36	22.2	21	80	26.3	0	39	0.0
Ossicle at the lambda (2)	7	54	13.0	9	40	22.5	16	94	17.0	2	28	7.1
Lambdoid ossicle (3)	47	56	83.9	38	45	84.4	85	101	84.2	16	27	59.3
Ossicle at the asterion (11)	9	51	17.6	7	40	17.5	16	91	17.6	2	16	12.5
Parietal notch bone (10)	6	50	12.0	7	40	17.5	13	90	14.4	1	17	5.9
Epipteric bone (8)(c)	3	38	7.9	3	20	15.0	6	58	10.3	0	17	0.0
Frontotemporal articulation (9) (b)	0	38	0.0	0	20	0.0	0	58	0.0	0	17	0.0
Stenokrotaphy (f)	4	38	10.5	0	20	0.0	4	58	6.9	0	17	0.0
Os incae	1	54	1.9	0	46	0.0	1	100	1.0	0	53	0.0
Sutura mendosa	3	53	5.7	1	46	2.2	4	99	4.0	1	53	1.9
Foramen of Hushke (13) – right	8	53	15.1	6	38	15.8	14	91	15.4	18	57	31.6
Foramen of Hushke (13) – left	9	54	16.7	7	38	18.4	16	92	17.4	32	64	50.0
Tuberculum praecondylicum (18) – two lateral	2	39	5.1	3	32	9.4	5	71	7.0	0	12	0.0
Tuberculum praecondylicum (18) – single mediosagittal	1	39	2.6	2	32	6.3	3	71	4.2	0	12	0.0
Supraorbital notch absent – right	4	47	8.5	1	35	2.9	5	83	6.0	14	53	26.4
Supraorbital notch absent – left	4	49	8.2	1	34	2.9	5	84	6.0	14	56	25.0
Supraorbital foramen complete (26) – right	11	47	23.4	9	36	5.6	20	83	24.1	5	53	9.4
Supraorbital foramen complete (26) – left	5	49	10.2	7	35	20.0	12	84	14.3	2	56	3.6
Frontal accessory foramen (27) – right	4	47	8.5	5	35	14.3	9	82	11.0	2	53	3.8
Frontal accessory foramen (27) – left	2	49	4.1	2	35	5.7	4	84	4.8	2	55	3.6
Os japonicum	0	50	0.0	0	40	0.0	0	90	0.0	0	42	0.0

Explanations:
+ = including juveniles (from 15 years)
++ = up to 14 years
n = number of cases with the feature
N = number of cases scanned for the feature
% = percentage
* = without 10 cases with physiological metopism of low age
() = after the names of features are in brackets numbers of features by Berry and Berry (1967) and/or letters of varieties of pterion by Martin and Saller (1959)

Tab. 12:1 Descriptive Morphological Features of the Trunk

Bone	Vertebrae																				Sacrum								Coxae							
Feature	Double foramen transversarium+																				Transitory vertebra+				Number of elements			Canalis sacralis open up to			Maximum concavity at			Size of the apophyses				Sulcus praeauricularis			
	C_3				C_4				C_5				C_6				C_7																					
Division	O—no +—present																				—				—			—			—			1—small 2—medium 3—large				O—no 1—slight 2—medium 3—deep and large			
Side	R N=28,30			L N=28,30			R N=29,29			L N=29,29			R N=29,27			L N=29,28			R N=30,29			L N=31,29			R N=32,27			L N=32,29			— N=30,24			— N=36,26			— N=39,29			— N=38,28			R N=50,43			L N=53,41			R N=47,35			L N=47,34		
	D	n	%	n	%	D	n	%	n	%	D	n	%	n	%	D	n	%	n	%	D	n	%	n	%	D	n	%	n	%	D	n	%	D	n	%	D	n	%	D	n	%	D	n	%	n	%
Males	0	28	100.0	28	100.0	0	27	93.1	27	93.1	0	21	72.4	23	79.3	0	13	43.3	15	48.4	0	29	90.6	28	87.5	Th_{11}	10	33.3	5	22	61.1	S_5	10	25.6	S_2	4	10.5	1	—	—	—	—	0	31	66.0	24	51.1
	+	—	—	—	—	+	2	6.9	2	6.9	+	8	27.6	6	20.7	+	17	56.7	16	51.6	+	3	9.4	4	12.5	Th_{12}	19	63.3	6	(+Cc_1)	12 33.3	S_4	15	38.5	S_1	28	73.7	2	14	28.0	11	20.8	1	15	31.9	20	42.6
																										L_1	1	3.3	6	(+L_5)	1 2.8	S_3	11	28.2	S_6§§	3	7.9	3	36	72.0	42	79.2	2	1	2.1	3	6.4
																													7 (+L_5+Cc_1)	1 2.8	S_2§	1	2.6	0§§	3	7.9						3	—	—	—	—
																															S_1§	2	5.1													
Females	0	29	96.7	30	100.0	0	26	89.7	26	89.7	0	20	74.1	22	78.6	0	17	58.6	19	65.5	0	25	92.6	29	100.0	Th_{11}	8	33.3	5	22	84.6	S_5	2	6.9	S_2	4	14.3	1	14	32.6	14	34.1	0	3	8.6	8	23.5
	+	1	3.3	—	—	+	3	10.3	3	10.3	+	7	25.9	6	21.4	+	12	41.4	10	34.5	+	2	7.4	0	—	Th_{12}	14	58.3	6	(+Cc_1)	3 11.5	S_4	13	44.8	S_1	22	78.6	2	23	53.5	22	53.7	1	11	31.4	8	23.5
																										L_1	2	8.3	6	(+L_5)*	1 3.8	S_3	11	37.9	S_6	2	7.1	3	6	14.0	5	12.2	2	8	22.9	11	32.4
																													7 (+L_5+Cc_1)	— —	S_2§	2	6.9	0§§	—	—						3	13	37.1	7	20.6
																															S_1§	1	3.4													

Explanations:
+ = studied in second series and D burials inside the mastaba
N = total number of males and females used for analysis of the feature
D = degree or category
n = number of cases
% = per cent
§ = hiatus canalis sacralis
§§ = flat sacrum
* = right-side sacralisation of L_5

Tab. 12:2 Descriptive Morphological Features of the Upper Extremity

Bone	Clavicula					Humerus										Radius								Ulna							
Feature	Impressio ligamenti costoclavicularis+					Tuberositas deltoidea				Crista tuberculi maioris+				Septal aperture				Tendinous relief at distal end				Curvature				Muscular relief				Curvature			
Division	O—no 1—flat area 2—shallow pit 3—medium pit 4—deep pit					1—slight 2—medium 3—large				1—slight 2—medium 3—strong (usually cleft)				O—no +—present				1—slight 2—medium 3—deep				1—slight 2—medium 3—strong				1—slight 2—medium 3—strong				1—slight 2—medium 3—strong			
Side	R N=24,28			L N=29,26		R N=56,45			L N=48,47							R N=53,42			L N=47,47					R N=49,43			L N=49,45					R N=44,36			L N=46,40					R N=50,42			L N=44,39					R N=31,27			L N=42,31		
	D	n	%	n	%	D	n	%	n	%	D	n	%	n	%	D	n	%	n	%	D	n	%	n	%	D	n	%	n	%	D	n	%	n	%	D	n	%	n	%	D	n	%	n	%	D	n	%	n	%
Males	0	2	8.3	6	20.7	1	10	17.9	6	12.5	1	5	16.7	6	20.7	0	46	86.8	40	85.1	1	8	16.3	7	14.3	1	—	—	2	4.3	1	1	2.0	1	2.3	1	3	9.7	2	4.8					
	1	7	29.2	12	41.4	2	11	19.6	11	22.9	2	15	50.0	29	69.0	+	7	13.2	7	14.9	2	24	49.0	27	55.1	2	24	54.5	25	54.3	2	21	42.0	18	40.9	2	16	51.6	24	57.1					
	2	7	29.2	9	31.0	3	35	62.5	31	64.6	3	10	33.3	3	10.3						3	17	34.7	15	30.6	3	20	45.5	19	41.3	3	28	56.0	25	56.8	3	12	38.7	16	38.1					
	3	6	25.0	1	3.4																																							
	4	2	8.3	1	3.4																																							
Females	0	8	28.6	11	42.3	1	11	24.4	13	27.7	1	6	21.4	5	17.2	0	27	64.3	29	61.7	1	26	60.5	27	60.0	1	7	19.4	15	37.5	1	7	16.7	6	15.4	1	6	22.2	6	19.4					
	1	19	67.9	15	57.7	2	20	44.4	19	40.4	2	21	75.0	23	79.3	+	15	35.7	18	38.3	2	17	39.5	17	37.8	2	16	44.4	16	40.0	2	26	61.9	27	69.2	2	15	55.6	15	48.4					
	2	1	3.6	—	—	3	14	31.1	17	36.2	3	1	3.6	1	3.4						3	—	—	1	2.2	3	13	36.1	9	22.5	3	9	21.4	6	15.4	3	6	22.2	10	32.3					
	3	—	—	—	—																																							
	4	—	—	—	—																																							

Explanations: see Table 12:1

Tab. 12:3 Descriptive Morphological Features of the Lower Extremity

Bone	Femur																Tibia						Fibula					
Feature	Tuberositas glutea				Trochanter tertius				Fossa hypotrochanterica				Tuberculum adductorium				Pilaster				Linea musculi solei				Squatting facette				Grooving				Curvature			
Division	1—slight 2—medium 3—strong				O—no +—present				O—no 1—slight 2—medium 3—deep				O—no 1—slight 2—medium 3—strong				Martin—Saller (1959)				O—no 1—slight 2—medium 3—strong				O—no ±—tiny +—well developed				1—slight 2—medium 3—deep				1—slight 2—medium 3—strong			
Side	R N=57,46			L N=61,53	R N=54,42			L N=55,50	R N=53,46			L N=57,51	R N=55,41			L N=58,48	R N=57,48			L N=59,50	R N=56,43			L N=56,41	R N=47,37			L N=42,33	R N=47,39			L N=40,47	R N=40,33			L N=34,36
	D	n	%	n %	D	n	%	n %	D	n	%	n %	D	n	%	n %	D	n	%	n %	D	n	%	n %	D	n	%	n %	D	n	%	n %	D	n	%	n %
Males	1	4	7.0	4 6.6	0	36	66.7	38 69.1	0	43	81.1	47 82.5	0	31	56.4	35 60.3	1	—	—	— —	1	21	37.5	19 33.9	0	17	36.2	19 45.2	1	10	21.3	11 27.5	1	6	15.0	7 20.6
	2	18	31.6	18 29.5	+	18	31.3	17 30.9	1	6	11.3	9 15.8	1	6	10.9	8 13.8	2	13	22.8	7 11.9	2	29	51.8	27 48.2	±	20	42.6	12 28.6	2	20	42.6	18 45.0	2	16	40.0	14 41.2
	3	35	61.4	39 63.9					2	3	5.7	1 1.8	2	15	27.3	12 20.7	3	28	49.1	32 54.2	3	6	10.7	10 17.9	+	10	21.3	11 26.2	3	17	36.2	11 27.5	3	18	45.0	38 38.2
									3	1	1.9	— —	3	3	5.5	3 6.3	4	16	28.1	20 33.9																
Females	1	5	10.9	9 17.0	0	34	81.0	46 92.0	0	40	87.0	44 86.3	0	34	82.9	35 72.9	1	—	—	— —	1	32	74.4	28 68.3	0	13	35.1	10 30.3	1	10	25.6	11 23.4	1	11	33.3	12 33.3
	2	28	60.9	34 64.2	+	8	19.0	4 8.0	1	6	13.0	6 11.8	1	6	14.6	8 16.7	2	7	14.6	14 28.0	2	8	18.6	9 22.0	±	15	40.5	13 39.4	2	21	53.8	30 63.8	2	17	51.5	19 52.8
	3	13	28.3	10 18.9					2	—	—	1 2.0	2	1	2.4	5 10.4	3	37	77.1	34 68.0	3	3	7.0	4 9.8	+	9	24.3	10 30.3	3	8	20.5	6 12.8	3	5	15.2	5 13.9
									3	—	—	— —	3	—	—	— —	4	4	8.3	2 4.0																

Explanations: see Table 12:1

Tab. 13:1 Dimensions and Indices of Children's Skulls Arranged in Age Succession (0—4.9 years, n = 29)

Age group	No.	Age mean	1	8	9	23	48	54	55	60	61	65	68(1)	1	13	48	51.2	54	62
0—0.9	A 36/2b	0.25	—	—	—	—	—	—	—	—	—	71	54	—	—	—	—	—	76.0
	I 455	0.625	—	—	—	—	—	—	—	—	—	67	53	—	—	—	—	—	79.1
	I 421	0.75	—	—	—	—	—	—	—	—	—	72	56	—	—	—	—	—	77.8
	A 25c	0.875	—	—	72?	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1—1.9	A 36/8b	1.0		—	—	—	—	—	—	—	—	—	63	—	—	—	—	—	—
	A 46i	1.0		—	72	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2—2.9	A 36/11b	2.0	—	—	74	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	J 1892	2.0	—	—	—	—	—	—	—	—	51	84	67	—	—	—	—	—	79.8
	A 17a	2.5	—	119	74	—	—	—	—	—	—	—	—	—	62.2	—	—	—	—
	A 36/7f	2.5	—	—	—	—	—	—	—	—	—	—	66?	—	—	—	—	—	—
	A 44/2h	2.5	—	126	82	—	—	—	—	—	—	—	—	—	65.1	—	—	—	—
	I 453	2.5	—	—	—	—	—	—	—	39	47	82	70	—	—	—	—	120.5	85.4
	A 36/7g	2.75	—	130	—	—	—	—	—	—	—	—	72	—	—	—	—	—	—
3—3.9	A 18a	3.0	—	—	—	—	—	18	—	38	46	84	72	—	—	—	—	121.1	85.7
	A 25b	3.0	—	130	—	—	—	—	—	—	—	79	68	—	—	—	—	—	86.1
	A 36/12c	3.0	—	—	—	—	—	—	—	36?	48?	—	—	—	—	—	—	133.3?	—
	I 446	3.0	—	—	83	—	—	—	—	40	54	87	69	—	—	—	—	135.0	79.3
	A 18b	3.5	—	135	—	—	—	20	—	38?	46	—	—	—	—	—	—	121.1	—
	A 36/7h	3.5	—	—	—	—	—	17?	—	—	52?	87?	76	—	—	—	—	—	87.4?
	A 44/1d	3.5	—	127	81	—	—	—	—	—	—	—	—	—	63.8	—	—	—	—
	A 46b	3.5	173	130	90	493	—	—	—	—	—	—	—	75.1	69.2	—	—	—	—
	I 464	3.5	—	—	—	—	—	—	—	41	50	—	76?	—	—	—	—	122.0	—
4—4.9	I 465	4.0	—	—	—	—	—	—	—	—	—	—	78?	—	—	—	—	—	—
	A 36/6c	4.5	—	—	78	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	A 36/9d	4.5	—	—	81	—	51	20	37	39	51	—	—	—	—	54.1	72.5	130.8	—
	A 36/9e	4.5	—	—	82	—	—	19	—	—	52	—	—	—	—	—	—	—	—
	A 36/10a	4.5	—	125?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	J 1890	4.5	—	—	—	—	—	—	—	—	—	—	70	—	—	—	—	—	—
	J 1974	4.5	—	—	—	—	—	—	—	44	53	89?	72	—	—	—	—	120.5	80.9?

Tab. 13:2 Dimensions and Indices of Children's Skulls Arranged in Age Succession (5—14.9 years, n = 31)

Age group	No.	Age mean	1	8	9	17	23	45	48	54	55	60	61	65	68(1)	32a	72	73	74	75	76	78	1	2	3	13	39	48	51.1	52.2	54	71	62
5—5.9	A 36/11a	5.0	—	128	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	I 382/1	5.0	—	—	—	—	—	—	—	—	—	—	—	88	76	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	86.4
	I 441	5.0	—	—	—	—	—	—	—	—	—	—	52?	89?	78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	87.6?
	A 38d	5.5	168	125	87?	122	469	—	56	22?	39	45?	56?	—	—	—	—	—	—	—	—	—	74.4	72.6	97.6	69.5?	—	56.4	—	69.6	124.4?	—	—
	A 44/1e	5.5	170	124	87	—	472	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	72.9	—	—	70.2	—	—	—	—	—	—	—
	J 1966	5.5	—	—	—	—	—	—	—	—	—	43	53?	88?	77?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	123.2	—	87.5
6—6.9	A 36/3a	6.0	—	—	84	—	—	—	—	—	—	—	—	86	77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	89.5
	A 44/2f	6.0	—	134?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	A 4	6.5	179	140	93	130	512	—	60	20	42	47?	58	—	—	83	88	88	88	73	120	95	78.2	72.6	92.9	66.4	—	47.6	—	70.0	123.4	—	—
	A 43/3c	6.5	—	—	88	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7—7.9	D 130b	7.0	—	—	—	—	—	—	—	—	—	—	—	95	84	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	88.4
	I 379	7.0	173	139	—	—	—	—	—	19	—	42	55	95	84	—	—	—	—	—	—	—	80.3	—	—	—	—	—	—	—	131.0	—	88.4
	J 1553	7.0	167	130	83	115	473	—	58	20	43	42	54	96	77	—	—	—	—	—	—	—	77.8	68.9	88.5	63.8	—	46.5	—	74.1	128.6	—	80.2
	A 20a	7.5	167	128	90	123	472	—	51	23	39	40	56	—	—	86	90	91	82	—	119	95	76.6	73.7	96.1	70.3	—	59.0	—	76.5	140.0	—	—
	A 35	7.5	167	135	92-	124	487?	112?	51	22	41	44	58	—	—	—	—	—	—	—	—	—	80.9	74.3	91.9	68.1	50.0?	53.7	19.6?	73.2	131.8	83.0?	—
	A 36/6b	7.5	177	135	85?	—	501	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	76.3	—	—	63.0?	—	—	—	—	—	—	—
	I 467	7.5	—	141	—	—	—	—	—	—	—	—	—	95?	82	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	86.3?
8—8.9	A 38c	8.5	170	136	89	125	485	106	55	20	40	43	54	—	—	90	91	93	84	69	129	98	80.0	73.5	91.9	65.4	51.9	50.0	18.9	72.7	125.6	77.9	—
	I 442	8.5	177	131	89	131	492	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	74.0	74.0	100.0	67.9	—	—	—	—	—	—	—
9—9.9	I 313	9.0	—	128?	—	—	—	—	—	—	—	—	—	100	82	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	82.0
	I 381	9.0	180	127	95	118	506	111	54	21	41	45	61	105	88	81	87	89	76	67	115	93	70.6	65.6	92.0	74.8	48.6	51.2	18.9	75.9	135.6	87.4	83.8
	I 420	9.5	188	147	99	136	535	118	58	24	43	44	59	109	88	91	93	93	89	—	131	100	78.2	72.3	92.5	67.3	49.2	55.8	20.3	74.1	134.1	80.3	80.7
10—10.9	A 36/9b	10.5	177	134	93	—	502?	—	—	—	—	51	66?	—	—	—	—	—	—	—	—	—	75.7	—	—	69.4	—	—	—	—	129.4?	—	—
	A 36/12b	10.5	—	132	—	—	—	—	—	—	—	52	64?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	123.1	—	—
11—11.9	A 41	11.5	—	127	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	I 413	11.5	—	—	—	—	—	—	—	—	—	—	—	103	92	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	89.3
12—14.9	I 403	13.5	180	142	96	132	513	—	66	23	50?	54	64	—	94?	—	—	—	—	—	—	—	78.9	73.3	93.0	67.6	—	46.0	—	75.8	118.5	—	—
	A 38b	14.0	167	—	—	—	470	—	—	—	38	49?	59?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	120.4?	—	—
	A 42c	14.0	—	—	—	—	—	—	—	23?	—	49?	59?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	120.4?	—	—
	A 46	14.0	173	133	93	131?	489	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	76.9	75.7?	98.5?	69.9	—	—	—	—	—	—	—
	I 417	14.0	171	—	—	—	498?	—	64?	22	44?	49	58	107?	86	—	—	—	—	—	—	—	—	—	—	—	—	50.0?	—	68.8	118.4	—	80.4

Tab. 13:3 Dimensions and Indices of Juveniles' Skulls Arranged in Sex and Age Succession (15—19 years, n = 7)

Sex	No.	Age mean	1	5	7	8	9	10	11	13(1)	BC	16	17	20	23	24	25	26	27	28	29	30	31	ML	MT	MB
M	A 34	15.0	177	98	38	131	88	105	110	111	116	31	133	113	490	300	359	118	127	114	103	115	96	31	12	20
	I 323	16.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	134?	114?	—	119?	96?	35	14	22
	A 15a	17.0	—	—	—	—	—	—	—	—	—	27	—	—	—	—	—	—	—	—	—	—	—	24	11	20
	I 407/1	19.0	182	97	33	141	97	113	113	111	124	29	122	111	518	308	362	123	123	116	108	110	95	31	13	22
F	A 26a	15.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	A 44/1a	17.0	180	104	37	136	96	113	111	112	118	30?	134	112	505	300	361	116	140	105	99	124	89	—	11+	19+
	J 1950	18.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	119?	—	—	99?	24	8	16

Sex	No.	1	2	3	MH	AC	4	5	HH	BB	BB'	BB"	SB	SB'	10	11	12	13	16	17	18	19	20	21	22	23	24	25	33	MM
M	A 34	74.0	75.1	101.5	86.4	—1.1	63.8	86.3	85.0	84.0	84.7	88.5	100.9	105.5	49.3	36.7	83.8	67.2	107.6	96.6	89.8	32.9	35.4	31.8	87.3	90.6	84.2	81.6	147.0	21.0
	I 323	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	85.1?	—	—	—	—	88.8?	84.2?	—	—	23.7
	A 15a	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18.3
	I 407/1	77.5	67.0	86.5	75.5	10.4	61.0	78.7	91.0	80.1	78.7	87.9	98.2	109.7	50.3	36.7	85.8	68.8	100.0	94.3	94.3	34.0	34.0	32.0	87.8	89.4	81.9	87.9	148.3	22.0
F	A 26a	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	A 44/1a	75.6	74.4	98.5	84.8	1.1	62.2	82.4	83.6	81.6	82.4	86.8	100.9	106.3	49.9	37.0	85.0	70.6	120.7	90.5	75.0	32.1	38.8	29.1	85.3	88.6	84.8	81.1?	150.0	—
	J 1950	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	83.2	—	—	16.0

Sex	No.	40	43	44	45	46	47	48	48.1	50	51	52	54	55	60	61	80.2'	UM	38	38.1	39	39.1	41	42	46a	48	51.1	51.2	54	60	61	68	UM	69	70	71
M	A 34	93	95	90	114	93?	—	60	15	17	40	30	23	45	50	62?	34*+	21*+	—	—	52.6	64.5	81.6	75.0	18.9	51.1	20.2	75.0	124.0	94.9	—	34.7*+	21.4*+	52.5	45.1	87.0
	I 323	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	A 15a	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	I 407/1	97	100	94	126?	92	109	63	18	22	38	33	22	45	52	63	34*	21*	86.5?	118.5	50.0?	68.5	73.0?	86.8	23.4	48.9	17.5?	71.4	121.2	100.0	110.7	35.1*	21.6*	53.3	51.6	89.4?
F	A 26a	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	A 44/1a	98	—	—	—	—	—	—	—	—	—	—	25?	48?	53?	62	—	36*+	21*+	—	—	—	—	—	—	52.1?	—	—	117.0?	94.2	—	34.6*+	20.2*+	54.4	—	—
	J 1950	—	—	—	—	—	—	—	19?	—	—	—	—	—	—	—	43	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Sex	No.	43.1	NH	57	SS	NP	SH	BI	TI	MH	FF	SI	NP	ZM	IM	32a	72	73	74	75	78	76
M	A 34	89	17	11	4	6.5	23	23+	7+	22+	19.1	36.4	38.2	24.7	30.4+	90	86	89	75	60	94	119
	I 323	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	A 15a	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	I 407/1	95	18	11.5	4	6	26	24	7	19	18.9	34.8	27.3	28.3	29.2	83	85	86	73	—	98	115
F	A 26a	—	—	—	—	—	—	—	—	22+	—	—	—	—	—	—	—	—	—	—	—	—
	A 44/1a	91	14.5	—	—	—	—	22	7	—	15.9	—	—	—	31.8	—	—	—	—	—	—	—
	J 1950	—	—	—	—	—	—	—	—	21	—	—	—	—	—	—	—	—	—	—	—	—

Sex	No.	65	66	68.1	69	69.1	69.3	70	70a	71	79	80.2"	LM	62	63	63'	64	66	68'	LM	40	FM
M	A 34	—	—	—	28	27	10	—	—	30	—	34*+	20*+	—	—	—	—	37.0	34.*+	20.4*+	—	—
	I 323	109	91	101?	32	30	11	51+	48+	31+	128?	43	30	92.7?	60.8+	64.6+	83.5	36.7	—	—	—	—
	A 15a	—	—	97?	30	28	10	52+	45+	27+	125+	45+	31+	—	51.9+	60.0+	—	35.7	—	—	—	—
	I 407/1	116	—	104	31	30	10	60	45	32	122	35*+	23*+	89.7	53.3	71.1	—	33.3	36.1*+	23.7*+	—	—
F	A 26a	—	—	—	26?	24	13	—	—	—	—	36+	21+	—	—	—	—	54.2	—	—	—	—
	A 44/1a	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	J 1950	109	92	98	31?	28	11	56	48	29	126	47+	33+	89.9	51.8	60.4	84.4	39.3	—	—	—	—

Explanations:
* = without third molar
+ = measured on the right side
' = upper pre—and molar length
" = lower pre—and molar length

Tab. 13:4 Diaphyseal Lengths and Other Dimensions of Children's and Juvenile's Infracranial Bones Arranged in Age Succession* (n = 46)

Age group	No.	Age mean	Clavicle		Humerus		Radius		Ulna		Femur		Tibia		Fibula		Ilium height		Ilium breadth		Ischium length		Pubis length		Reconstructed stature**
			R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	
0–0.9	I 459	0.375	–	56	–	84	–	66	75	75	104	–	–	–	–	–	–	–	–	–	25?	–	–	–	66.9
	J 394	0.375	57	56	82	82	67	–	–	76	103	103	88	88	85	86	42?	42	48	–	25	25	21	21	66.3
	I 374/1	0.625	54	–	95	–	–	71	–	–	–	117	–	–	–	–	–	–	50	50	30	30	21	22	74.4?
	I 455	0.625	56	55	–	–	69	–	–	–	–	–	–	–	–	–	–	–	45	–	–	26	–	–	–
	I 421	0.75	–	–	95	94	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	32	–	–	–
	I 470	0.75	–	56	97	97	–	–	–	–	122	122	–	–	–	–	–	–	48	48	25	–	–	–	77.5
1–1.9	J 1963	1.25	–	–	–	–	87	–	94	94?	143	142	116	117	109	–	55	54?	57?	–	34	34	28	28	88.2
	I 468	1.75	66	65	117	115	91	–	–	102	148	148	123	122	114	–	–	54	57	59	35	36	28	–	91.6
2–2.9	I 380/2	2.0	–	–	–	120	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	J 1892	2.0	–	–	–	–	90	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	I 327	2.25	67	–	123	121	90	89	102	100	156	158	130	132	124	–	60	60	66	67	41	40	31	31	95.4
	I 305	2.5	–	–	128	125	–	95	107	–	166	167	133	–	124	–	58	59	62	61	39	37	29	28	99.9
	I 374/2	2.5	67	–	122	121	–	92	–	102	167	166	137	136	–	131	–	58	60	60	–	38	30	–	99.9
	I 453	2.5	–	67	–	125	–	–	–	–	–	–	132	–	–	–	59	–	64	–	36	–	28	–	–
3–3.9	I 325	3.0	–	–	133	131	101	–	113	–	180	180	146	145	–	140	58	59	65	67	39	40	31	31	105.5
	I 446	3.0	–	74	133	132	101	100	–	–	171	173	145	147	–	–	–	–	–	–	–	43	–	33?	102.3
	D 230b	3.0	69	–	128	–	–	–	–	112	–	174	–	–	–	–	–	62?	65?	–	–	–	–	–	103.1
	I 387	3.5	–	65	138	–	105	104	117	–	187	189	–	–	–	–	–	–	72?	72?	41	41	33	33	108.7
	I 397	3.5	68?	–	–	–	–	–	–	–	187	189	–	–	–	–	–	–	–	–	43	44	33?	–	108.7
	I 464	3.5	74	76	137	136	107	105	116	113	181	182	152	153	148	150	66	67	75	73	43	44	35	35	106.1
	D 226c	3.5	–	67	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	39	38	–	33	–
4–4.9	I 390	4.0	–	–	138	137	112	110	127	123	187	187	155	157	149	–	–	64	75	74	43?	44	36	35	108.3
	I 465	4.0	76	75	146	–	–	–	–	–	199	199	–	–	–	–	67	–	74	–	44	43	36	37	113.4
	J 1885	4.0	–	70	148	146	–	–	–	–	–	–	–	–	–	–	–	–	72	72	41	42	31	32	–
	J 1890	4.5	75	76	147	145	116	113	131	128	212	208	177	175	170	–	73	–	83	–	43	–	–	32	116.0
	J 1974	4.5	77	78	148	146	110	109	124	123	201	202	165	164	161	162	71	72	80	80	43	44	35	35	114.3
5–5.9	I 382/1	5.0	78	78	152	151	120	117	133	128	209	213	172	175	–	172	68?	–	77?	–	–	45	34	–	116.3
	I 441	5.0	–	–	–	150	116	114	128	125	211	209	175	174	–	–	–	–	–	–	45	45	36	34?	116.0
	J 1966	5.5	–	80	160	159	123	123	139	138	225	225	185	185	182	181	74	73?	85	–	48	48	–	40	120.5
6–6.9	I 400	6.0	88	–	170	170	127	126	141	139	237	237	189	189	–	–	79	79	91	89?	52	53	40	40	124.1
	I 462	6.0	–	–	–	–	127	124	141	138	234	234	191	193	188	189	77	–	84	–	49	50	38	40	123.2
	D 130b	6.0	–	–	–	–	–	–	–	–	231	–	198	201	193	194	80	81	86	84	–	–	–	40	122.3
7–7.9	I 379	7.0	88	89	188	180	144	142	159	–	264	264	220	216	212	210	85	85	93	92	52	53	43	43	131.4
	J 1553	7.0	92	93	170	167	133	130	–	143	247	–	208	207	203	202	83	82	91	–	50	49	41	43	126.8
	I 467	7.5	95	94	188	187	148	147	166	164?	261	263	217	220	215	–	85	85	92	92	–	–	–	40	130.8
8–8.9	I 439	8.0	–	–	–	–	–	–	–	–	269	–	216	218	–	211	–	–	–	–	–	–	–	46	133.0
	I 442	8.5	97	–	200	197	156	157	–	172	276	278	239	235	236	233	–	94	–	102	53	54	42	43	135.0
9–9.9	I 313	9.0	97	93	205	–	–	–	–	–	289	290	238	–	229	230	–	–	–	–	58	60	43	45	138.4
	I 381	9.0	97	–	187	185	154	–	172	–	–	–	–	–	–	–	–	–	–	98?	56	–	–	–	–
	I 420	9.5	103	105	209	206	162	161	179	–	310	307	244	244	241	240	98	98	109	111	60	61	49	49	143.2
10–11.9	I 413	11.5	–	108	–	228?	–	178?	–	198?	339	341	270	271	–	263?	–	98	–	110	67	65	50	51	151.0
12–14.9	I 403	13.5	116	107	244	242	191	190	211	210	353	355	301	300	–	283	101	105	114	115	65	65	50	53	154.6
	I 417	14.0	–	109	262	257	196	192	217	213	364	363	308	305	296	–	104	107	124	124	75	76	–	61	157.0
15–19.9	I 323 (M)	16.0	128	130	288+	282+	221	217	247	244	397	397	332	329	–	–	–	120	141	136	85	84	–	65	168.5
	J 1950 (F)	18.5	–	–	272+	267+	226++	–	–	246++	384	385	–	–	–	–	–	–	–	–	–	–	–	–	163.2
	I 407 (M)	19.0	–	–	298+	290+	–	229++	–	253	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Explanations:
* = all values in mm except stature (cm)
** = according to femur, table by Stewart in Olivier (1960:259)
(If both femora preserved, their mean was used)
R = right
L = left
(M) = male
(F) = female
+ = 13 mm subtracted for the fused distal epiphysis
++ = 6 mm subtracted for the fused proximal epiphysis

Tab. 14:1 Survey of Traumatic Lesions

Anatomical localisation		Kind of injury	Males Individuals nos:	n	Females Individuals nos:	n	Laterality R	L	M	Total n	%
Skull	Frontal	Depressed fracture									
		– stab	A 1, A 6, A 44/2d	3	–	–	2	–	1	4	12.9
		– blunt blow	–	–	I 383	1	–	1	–		
	Parietal	– cut	A 10, A 36/3b*	2	A 36/9a+++	1	1	1	1	4	12.9
		– blow (caut.?)	–	–	I 324	1	–	1	–		
	Nasal	Fracture	A 12	1	–	–	–	1	–	1	3.2
Spine	L_1	Compression fracture	J 1483	1	–	–	–	–	1	2	6.5
	L_4		–	–	A 46–4	1	–	–	1		
Upper extremity and girdle	Clavicle	Fracture	A 23–L 3+, J 1973	2	I 448	1	1	2	–	3	9.7
	Humerus	Posttraumatic change	A 43/2–R 1*+	1	–	–	1	–	–	1	3.2
	Radius	Fracture	A 20–L 1*+, A 36/12-R 2	2	A 36/3A, J 1960	2	2	2	–	4	12.9
	Ulna	Fracture	A 7-R 1, D 334, I 407/2, I 452++, I 466	5	–	–	4	1	–	5	16.1
	Antebrachial	Posttraumatic change	–	–	A 36/4-R 1	1	1	–	–	2	6.5
		Amputation	A 36/7B-1+2	1	–	–	1	–	–		
	Metacarpal IV	Fracture	A 44/2	1	D 135	1	1	1	–	3	9.7
	Phalanges V	Posttraumatic change	A 46	1	–	–	–	1	–		
Lower extremity and girdle	Coxae	Fracture	I 444	1	–	–	1	–	–	1	3.2
	Crural	Fracture	I 452*	1	–	–	1	–	–	1	3.1
Total n	–	–	–	22	–	9	16	11	4	31	–
%	–	–	–	71.0	–	29.0	51.6	35.5	12.9	–	100.0

Explanations:
R = right
L = left
M = mid-line or both sides
* = complicated by inflammation
+ = complicated by arthrosis
++ = double fracture
+++ = triple cut
(caut) = cauterization

Tab. 14:2 Osteophytosis of the Spine in Adults

Sex	Degree	C_1	C_2	C_3	C_4	C_5	C_6	C_7	Th_1	Th_2	Th_3	Th_4	Th_5	Th_6	Th_7	Th_8	Th_9	Th_{10}	Th_{11}	Th_{12}	L_1	L_2	L_3	L_4	L_5	S_1
M*	0	20	18	24	18	19	19	24	23	21	22	18	19	18	14	13	15	17	17	21	21	17	12	11	10	14
	1	5	7	4	8	9	5	3	5	5	4	7	8	12	10	9	11	9	8	6	6	10	10	9	10	7
	2	1	3	1	1	1	4	1	1	1	2	1	1	1	5	4	1	0	0	2	3	2	6	9	9	6
	3	–	–	–	–	1	1	–	–	–	1	1	1	1	1	4	3	3	2	2	–	2	2	2	2	1
	$\sum$	26	28	29	27	30	29	28	29	27	29	27	29	32	30	30	30	29	27	31	30	31	30	31	31	28
	$\bar{x}$	0.3	0.5	0.2	0.4	0.5	0.6	0.2	0.2	0.3	0.4	0.4	0.4	0.5	0.8	1.0	0.7	0.6	0.5	0.5	0.4	0.6	0.9	1.1	1.1	0.8
F*	0	19	19	24	19	16	20	20	24	24	16	17	13	11	10	10	8	12	11	20	18	14	12	12	11	15
	1	4	5	2	7	6	5	3	3	2	10	6	11	12	10	13	13	9	11	3	4	6	9	6	8	7
	2	–	1	1	1	4	2	2	–	–	–	3	2	4	6	2	2	3	1	–	2	2	3	7	7	2
	3	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1
	$\sum$	23	25	27	27	26	28	26	27	26	26	26	26	27	26	25	23	24	23	23	24	22	24	26	26	25
	$\bar{x}$	0.2	0.3	0.1	0.3	0.5	0.4	0.4	0.1	0.1	0.4	0.5	0.6	0.7	0.8	0.7	0.7	0.6	0.6	0.1	0.3	0.5	0.6	0.9	0.8	0.6
M+F**	0	19	21	15	16	13	13	20	19	14	17	17	23	19	13	16	12	9	11	20	27	20	22	17	10	12
	1	4	5	1	3	3	2	3	1	–	2	6	3	5	12	6	4	13	5	4	5	3	4	4	11	10
	2	1	2	1	1	1	1	1	–	–	1	1	3	3	2	2	2	2	2	3	1	4	7	7	2	1
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2	1	–	–	3	3	3	5	2	1
	$\sum$	24	28	17	20	17	16	24	20	14	20	24	29	27	27	26	20	25	18	27	36	30	36	33	25	24
	$\bar{x}$	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.1	0.0	0.2	0.3	0.3	0.4	0.6	0.6	0.7	0.8	0.5	0.4	0.4	0.7	0.8	1.0	0.8	0.6

Explanations:
M = males
F = females
* = second series (outside the mastaba) with D burials (inside the mastaba)
** = first series (inside the mastaba) without D burials
$\sum$ = total no. of vertebrae
$\bar{x}$ = mean degree

Tab. 14:3 Osteophytosis of the Spine according to Age and Sex

Age group	Males							Females						
	Mean age	No. of individuals	No. of vertebrae with degree 0	1	2	3	total	Mean degree	Mean age	No. of individuals	No. of vertebrae with degree 0	1	2	3	total	Mean degree
10–19	15.6	4	75	–	–	–	75	0.0	19.2	3	65	–	–	–	65	0.0
20–29	24.9	11	190	47	7	–	244	0.2	25.2	10	162	33	2	–	197	0.2
30–39	31.7	12	147	53	17	5	222	0.5	33.6	11	148	70	13	1	232	0.4
40–x	43.6	11	94	79	45	13	231	0.9	43.6	11	113	68	40	2	223	0.7

Tab. 14:4 Frequency of Cribra Orbitalia

Age group	Sex	n	No cribra	Cribra				
				1	2	3	Total	%
0–14	–	62	36	18	5	3	26	41.9
15–19	M	2	–	1	1	–	2	100.0
	F	3	1	2	–	–	2	66.7
	M+F	5	1	3	1	–	4	80.0
20–59	M	39	35	3	1	–	4	10.3
	F	36	32	3	1	–	4	11.1
	M+F	75	67	6	2	–	8	10.7
Total	M+F	142	104	27	8	3	38	26.8

Explanations:
M = males
F = females
1 = porotic type
2 = cribrotic type
3 = trabecular type

Tab. 14:5 Frequency of Spondylolysis

Feature	Males*		Females*		Children*		Both sexes**		Total	
	L_4	L_5	L_4	L_5	L_4	L_5	L_4	L_5	L_4	L_5
present	2	1	1	1	0	1	0	2	3	5
absent	30	30	30	30	2	1	35	24	97	85
total	32	31	31	31	2	2	35	26	100	90
% present	6.3	3.2	3.2	3.2	0.0	50.0	0.0	7.7	3.0	5.6

Explanations:
* = adults and juveniles with the pertinent vertebrae, second series (outside the mastaba) and D burials (inside the mastaba)
** = adult and juvenile dispersed vertebrae, first series (inside the mastaba) without D burials

Tab. 15:1 State of Preservation of the Dentition according to Teeth and Sex

Localisation	Sex	No. of individuals	I_1		I_2		C		P_1		P_2		M_1		M_2		M_3		Ideal no. of teeth	Total A		Total D	
			A	D	A	D	A	D	A	D	A	D	A′	D	A	D	A	D		n	CAI	n	CDI
Upper right	M	75	46	19	47	25	48	30	49	45	48	42	47	46	43	39	41	33	599	369	61.6	279	46.6
	F	62	41	16	39	19	40	25	41	32	41	35	41	40	38	36	37	32	494	318	64.4	235	47.0
	M+F	137	87	35	86	44	88	55	90	77	89	77	88	86	81	75	78	65	1093	687	62.9	514	47.0
Upper left	M	75	50	21	51	26	53	34	51	43	49	37	51	50	47	47	43	41	599	395	65.9	299	49.9
	F	62	41	19	42	23	41	31	42	31	42	30	41	38	38	35	36	31	494	323	65.4	238	48.2
	M+F	137	91	40	93	49	94	65	93	74	91	67	92	88	85	82	79	72	1093	718	65.7	537	49.1
Lower right	M	75	48	24	51	32	49	33	52	41	52	46	53	51	51	49	49	46	599	405	67.6	322	53.8
	F	62	49	32	47	31	47	33	46	40	46	37	46	45	47	44	47	44	494	375	75.9	306	61.9
	M+F	137	97	56	98	63	96	66	98	81	98	83	99	96	98	93	96	90	1093	780	71.4	628	57.5
Lower left	M	75	49	25	51	35	52	36	52	38	52	49	51	50	52	51	51	47	599	410	68.4	331	55.3
	F	62	48	29	48	29	48	31	48	36	49	39	49	47	49	48	49	46	494	388	78.5	305	61.7
	M+F	137	97	54	99	64	100	67	100	74	101	88	100	97	101	99	100	93	1093	798	73.0	636	58.2

Explanations:
A = number of preserved alveoli (including those with hypodoncy and retention as well as presumed alveoli in the instances of loose teeth)
D = number of preserved teeth (including hypodontic and in retention, excluding secondary torsos)
n = absolute number
CAI = comparative alveolar index (= number of preserved alveoli in percentage of the ideal number of teeth)
CDI = comparative dental index (= number of preserved teeth in percentage of the ideal number of teeth)
M = males
F = females

Tab. 15:2 State of Preservation of the Dentition according to Age and Sex

Age group	Sex	No.of individuals	Ideal no. of teeth	Total A		Total D	
				n	CAI	n	CDI
15—19	M	4	124	102	82.3	69	55.6
	F	6	184	128	69.6	91	49.5
	M+F	10	308	230	74.7	160	51.9
20—29	M	23	736	451	61.3	358	48.6
	F	21	672	471	70.1	357	53.1
	M+F	44	1408	922	65.5	715	50.8
30—39	M	26	832	550	66.1	440	52.9
	F	21	672	494	73.5	384	57.1
	M+F	47	1504	1044	69.4	824	54.8
40—59	M	22	704	476	67.6	364	51.7
	F	14	448	311	69.4	252	56.3
	M+F	36	1152	787	68.3	616	53.5
Total	M	75	2396	1579	65.9	1231	51.4
	F	62	1976	1404	71.1	1084	54.9
	M+F	137	4372	2983	68.2	2315	53.0

Explanations:
see Tab. 15:1

Tab. 15:3 Frequency of Hypodontic Teeth

Sex	M_3d			M_3s			M_3d+s			P_1d			P_1d+s			I_2d			I_2d+s			All teeth		
	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%
Upper jaw																								
M	41	4	9.8	43	7	16.3	84	11	13.1	49	1	2.0	100	1	1.0	47	—	0.0	98	—	0.0	764	12	1.6
F	37	3	8.1	36	5	13.9	73	8	11.0	41	—	0.0	83	—	0.0	39	—	0.0	81	—	0.0	641	8	1.2
M+F	78	7	9.0	79	12	15.2	157	19	12.1	90	1	1.1	183	1	0.5	86	—	0.0	179	—	0.0	1405	20	1.4
Lower jaw																								
M	49	5	10.2	51	6	11.8	100	11	11.0	52	—	0.0	104	—	0.0	51	—	0.0	102	—	0.0	815	11	1.3
F	47	6	12.8	49	6	12.2	96	12	12.5	46	—	0.0	94	—	0.0	47	1	2.1	95	1	1.1	763	13	1.7
M+F	96	11	11.5	100	12	12.0	196	23	11.7	98	—	0.0	198	—	0.0	98	1	1.0	197	1	0.5	1578	24	1.5
Whole dentition																								
M	90	9	10.0	94	13	13.8	184	22	12.0	101	1	1.0	204	1	0.5	98	—	0.0	200	—	0.0	1579	23	1.5
F	84	9	10.7	85	11	12.9	169	20	11.8	87	—	0.0	177	—	0.0	86	1	1.2	176	1	0.6	1404	21	1.5
M+F	174	18	10.3	179	24	13.4	353	42	11.9	188	1	0.5	381	1	0.3	184	1	0.5	376	1	0.3	2983	44	1.5

Explanations:
d = right
s = left
N = number of preserved alveoli
n = number of hypodontic teeth
% = percentage of hypodontic teeth
M = males
F = females

Tab. 15:4 Frequency of Teeth in Retention

Sex	M_3d			M_3s			M_3d+s			Cd			Cs			Cd+s			All teeth		
	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%
Upper jaw																					
M	41	1	2.4	43	—	0.0	84	1	1.2	48	—	0.0	53	1	1.9	101	1	1.0	764	2	0.3
F	37	—	0.0	36	—	0.0	73	—	0.0	40	—	0.0	41	1	2.4	81	1	1.2	641	1	0.2
M+F	78	1	1.3	79	—	0.0	157	1	0.6	88	—	0.0	94	2	2.1	182	2	1.1	1405	3	0.2
Lower jaw																					
M	49	—	0.0	51	2	3.9	100	2	2.0	49	1	2.0	52	1	1.9	101	2	2.0	815	4	0.5
F	47	—	0.0	49	—	0.0	96	—	0.0	47	—	0.0	48	—	0.0	95	—	0.0	763	—	0.0
M+F	96	—	0.0	100	2	2.0	196	1	0.5	96	1	1.0	100	1	1.0	196	1	0.5	1578	4	0.3
Whole dentition																					
M	90	1	1.1	94	2	2.1	184	3	1.6	97	1	1.0	105	2	1.9	202	3	1.5	1579	6	0.4
F	84	—	0.0	85	—	0.0	169	—	0.0	87	—	0.0	89	1	1.1	176	1	0.6	1404	1	0.1
M+F	174	1	0.6	179	2	1.1	353	3	0.8	184	1	0.5	194	3	1.5	378	4	1.1	2983	7	0.2

Explanations:
d = right
s = left
N = number of preserved alveoli
n = number of teeth in retention
% = percentage of teeth in retention
M = males
F = females

Tab. 15:5 Dental Abrasion of Single Teeth according to Age

Jaw	Age group	I_1		I_2		C		P_1		P_2		M_1		M_2		M_3		All teeth	
		$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n
Upper	15–19	3.0	5	1.0	5	2.0	6	1.3	10	1.3	12	3.2	12	1.0	11	0.0	5	1.6	66
	20–29	3.6	18	3.3	21	3.5	41	3.8	48	3.9	44	4.6	48	2.9	50	1.3	33	3.4	303
	30–39	5.1	29	4.7	35	5.3	42	5.5	38	5.1	36	5.3	29	4.2	37	2.8	29	4.7	275
	40–59	5.4	13	5.3	18	5.5	18	6.2	20	5.8	20	6.6	18	4.8	16	3.4	16	5.4	139
	Total	4.3	65	3.6	79	4.1	107	4.2	116	4.0	112	4.9	107	3.2	114	1.9	83	3.8	783
Lower	15–19	3.0	8	2.8	8	1.6	9	0.8	13	0.8	12	2.8	14	1.2	13	0.0	7	1.6	84
	20–29	3.9	27	3.7	36	3.6	37	3.4	49	3.5	50	4.5	53	3.2	53	1.2	44	3.4	349
	30–39	5.7	33	5.2	39	4.9	46	4.8	54	4.8	53	5.4	42	4.1	61	2.9	48	4.7	376
	40–59	5.9	16	5.6	18	5.6	27	5.6	28	5.3	23	5.9	18	4.7	30	3.9	30	5.3	190
	Total	4.7	84	4.3	101	3.9	119	3.7	144	3.6	138	4.7	127	3.3	157	2.0	129	3.8	999
Both	Total	4.6	149	4.0	180	4.0	226	3.9	260	3.8	250	4.8	234	3.3	271	1.9	212	3.8	1782

Explanation:
left and right sides and both sexes combined
$\bar{x}$ = mean degree of abrasion
n = number of teeth in which abrasion could be investigated

Tab. 15:6 Dental Abrasion according to Age and Sex

Age group	Upper teeth						Lower teeth					
	M		F		M+F		M		F		M+F	
	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n
15–19	1.8	24	1.5	42	1.6	66	1.5	39	1.7	45	1.6	84
20–29	3.4	148	3.3	155	3.4	303	3.5	171	3.2	178	3.4	349
30–39	4.7	157	4.8	118	4.7	275	4.6	203	4.8	173	4.7	376
40–59	5.5	92	5.3	47	5.4	139	5.6	113	5.0	77	5.3	190
Total	3.9	421	3.7	362	3.8	783	3.8	526	3.7	473	3.8	999

Explanations:
M = males
F = females
$\bar{x}$ = mean degree of abrasion
n = number of teeth in wchich abrasion could be investigated

Tab. 15:7 Frequency of Paleopathological Findings in Single Teeth

Pathological finding	Sex	I_1			I_2			C			P_1			P_2			M_1			M_2			M_3			Total		
		N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%	N	n	%
Upper jaw																												
Caries	M	40	–	0.0	51	2	3.9	63	3	4.8	87	1	1.1	79	–	0.0	96	3	3.1	86	3	3.5	62	5	8.1	564	17	3.0
	F	35	–	0.0	42	–	0.0	55	2	3.6	63	1	1.6	65	1	1.5	78	3	3.8	71	3	4.2	55	3	5.5	464	13	2.8
	M+F	75	–	0.0	93	2	2.2	118	5	4.2	150	2	1.3	144	1	0.7	174	6	3.4	157	6	3.8	117	8	6.8	1028	30	2.9
Radices	M	40	–	0.0	51	–	0.0	63	1	1.6	87	7	8.0	79	2	2.5	96	1	1.0	86	2	2.3	62	–	0.0	564	13	2.3
	F	35	–	0.0	42	–	0.0	55	2	3.6	63	7	11.1	65	4	6.2	78	2	2.6	71	–	0.0	55	–	0.0	464	15	3.2
	M+F	75	–	0.0	93	–	0.0	118	3	2.5	150	14	9.3	144	6	4.2	174	3	1.7	157	2	1.3	117	–	0.0	1028	28	2.7
Intravital losses	M	96	8	8.3	98	10	10.2	101	5	5.0	100	11	11.0	97	15	15.5	98	36	36.7	90	22	24.4	84	16	19.00	764	123	16.1
	F	82	2	2.4	81	2	2.5	81	2	2.5	83	8	9.6	83	12	14.5	82	26	31.7	76	18	23.7	73	16	21.9	641	86	13.4
	M+F	178	10	5.6	179	12	6.7	182	7	3.8	183	19	10.4	180	27	15.0	180	62	34.4	166	40	24.1	157	32	20.4	1405	209	14.9
Periapical foci	M	96	2	2.1	98	4	4.1	101	6	5.9	100	10	10.0	97	6	6.2	98	8	8.2	90	4	4.4	84	1	1.2	764	41	5.4
	F	82	1	1.2	81	1	1.2	81	3	3.7	83	9	10.8	83	8	9.6	82	12	14.6	76	5	6.6	73	1	1.4	641	40	6.2
	M+F	178	3	1.7	179	5	2.8	182	9	4.9	183	19	10.4	180	14	7.8	180	20	11.1	166	9	5.4	157	2	1.3	1405	81	5.8
Lower jaw																												
Caries	M	49	–	0.0	67	2	3.0	67	–	0.0	79	1	1.3	95	3	3.2	101	2	2.0	100	1	1.0	80	1	1.3	638	10	1.6
	F	61	–	0.0	59	1	1.7	64	3	4.7	76	1	1.3	76	4	5.3	92	4	4.3	92	1	1.1	78	2	2.6	598	16	2.7
	M+F	110	–	0.0	126	3	2.4	131	3	2.3	155	2	1.3	171	7	4.1	193	6	3.1	192	2	1.0	158	3	1.9	1236	26	2.1
Radices	M	49	–	0.0	67	2	3.0	67	1	1.5	79	–	0.0	95	6	6.3	101	2	2.0	100	–	0.0	80	–	0.0	638	11	1.7
	F	61	–	0.0	59	–	0.0	64	–	0.0	76	1	1.3	76	1	1.3	92	4	4.3	92	–	0.0	78	3	3.8	598	9	1.5
	M+F	110	–	0.0	126	2	1.6	131	1	0.8	155	1	0.6	171	7	4.1	193	6	3.1	192	–	0.0	158	3	1.9	1236	20	1.6
Intravital losses	M	97	13	13.4	102	7	6.9	101	3	3.0	104	1	1.0	104	12	11.5	104	33	31.7	103	15	14.6	100	15	15.0	815	99	12.1
	F	97	15	15.5	95	14	14.7	95	9	9.5	94	10	10.6	95	10	10.5	95	25	26.3	96	17	17.7	96	14	14.6	763	114	14.9
	M+F	194	28	14.4	197	21	10.7	196	12	6.1	198	11	5.6	199	22	11.1	199	58	29.1	199	32	16.1	196	29	14.8	1578	213	13.5
Periapical foci	M	97	4	4.1	102	2	2.0	101	3	3.0	104	2	1.9	104	5	4.8	104	7	6.7	103	2	1,9	100	1	1.0	815	26	3.2
	F	97	3	3.1	95	3	3.2	95	1	1.1	94	3	3.2	95	2	2.1	95	8	8.4	96	2	2.1	96	1	1.0	763	23	3.0
	M+F	194	7	3.6	197	5	2.5	196	4	2.0	198	5	2.5	199	7	3.5	199	15	7.5	199	4	2.0	196	2	1.0	1578	49	3.1

Explanations:
right and left sides combined
N = number of preserved elements (teeth for caries and radices, alveoli for intravital losses and periapical foci)
n = number of pathological findings
% = percentage of pathological findings
M = males
F = females

Tab. 15:8 Frequency of Palaeopathological Findings in the Dentition according to Age and Sex

Age group	Sex	Caries			Radices			Intravital losses			Periapical foci			CRE index
		N	n	%	N	n	%	N	n	%	N	n	%	
15–19	M	65	–	0.0	65	–	0.0	102	1	1.0	102	–	0.0	1.0
	F	88	2	2.3	88	–	0.0	128	–	0.0	128	–	0.0	2.3
	M+F	153	2	1.3	153	–	0.0	230	1	0.4	230	–	0.0	1.7
20–29	M	350	8	2.3	350	6	1.7	451	24	5.3	451	9	2.0	9.3
	F	344	8	2.3	344	2	0.6	471	6	1.3	471	2	0.4	4.2
	M+F	694	16	2.3	694	8	1.2	922	30	3.3	922	11	1.2	6.8
30–39	M	431	10	2.3	431	10	2.3	550	58	10.5	550	27	4.9	15.1
	F	379	9	2.4	379	11	2.9	494	78	15.8	494	27	5.5	21.1
	M+F	810	19	2.3	810	21	2.6	1044	136	13.0	1044	54	5.2	17.9
40–59	M	356	9	2.5	356	8	2.2	476	139	29.2	476	31	6.5	33.9
	F	251	10	4.0	251	11	4.4	311	116	37.3	311	34	0.9	45.7
	M+F	607	19	3.1	607	19	3.1	787	254	32.3	787	65	8.3	38.5
Total	M	1202	27	2.2	1202	24	2.0	1579	222	14.1	1579	67	4.2	18.3
	F	1062	29	2.7	1062	24	2.3	1404	200	14.2	1404	63	4.5	19.2
	M+F	2264	56	2.5	2264	48	2.1	2983	422	14.1	2983	130	4.4	18.7

Explanations:
N = number of preserved teeth (for caries and radices) or alveoli (for intravital losses and periapical foci)
n = absolute number
% = percentage
M = males
F = females

Tab. 15:9 Frequency of Individuals with Palaeopathological Findings in the Dentition

Age group	M			F			M+F		
	N	n	%	N	n	%	N	n	%
15–19	4	1	25.0	6	1	16.7	10	2	20.0
20–29	23	7	30.4	21	6	28.6	44	13	29.5
30–39	26	20	76.9	21	13	61.9	47	33	70.2
40–59	22	22	100.0	14	14	100.0	36	36	100.0
Total	75	50	66.7	62	34	54.8	137	84	61.3

Explanations:
M = males
F = females
N = number of individuals in the group
n = number of individuals with palaeopathological findings
% = percentage of individuals with palaeopathological findings

Tab. 15:10 Kinds of Dental Caries according to Age and Sex

Age group	Sex	No. of caries		Fissural+		Occlusal		Buccal or lingual		Approximal		Neck	
		n	%	n	%	n	%	n	%	n	%	n	%
15–19	M	–	0.0	–	0.0	–	0.0	–	0.0	–	0.0	–	0.0
	F	2	3.6	1	1.8	1	1.8	–	0.0	–	0.0	–	0.0
	M+F	2	3.6	1	1.8	1	1.8	–	0.0	–	0.0	–	0.0
20–29	M	8	14.3	1	1.8	1	1.8	2	3.6	4.	7.1	–	0.0
	F	8	14.3	6*	10.7	–	–	–	–	2	3.6	–	0.0
	M+F	16	28.6	7	12.5	1	1.8	2	3.6	6	10.7	–	0.0
30–39	M	10	17.9	–	0.0	–	–	–	0.0	8	14.3	2	3.6
	F	9	16.1	–	0.0	1	1.8	–	0.0	8	14.3	–	–
	M+F	19	33.9	–	0.0	1	1.8	–	0.0	16	28.6	2	3.6
40–59	M	9	16.1	–	0.0	1	1.8	–	0.0	7	12.5	1	1.8
	F	10	17.9	–	0.0	–	–	–	0.0	10**	17.9	–	–
	M+F	19	33.9	–	0.0	1	1.8	–	0.0	17	30.4	1	1.8
Total	M	27	48.2	1	1.8	2	3.6	2	3.6	19	33.9	3	5.4
	F	29	51.8	7	12.5	2	3.6	–	–	20	35.7	–	–
	M+F	56	100.0	8	14.3	4	7.1	2	3.6	39	69.6	3	5.4

Explanations:
+ = including caries originating in foramen caecum
M = males
F = females
* = in one case three, in one case two caries in the same tooth
** = in one case on both approximal sides

Tab. 15:11 Intensity and Location of Dental Calculus according to Age and Sex

Age group	Sex	No. of individuals	No calculus		1+									2+							3+		Total	
					UL	LL	BL	UF	LF	LJ	BJ	together		UL	LL	LF	LJ	BJ	together		together			
			n	%	n	n	n	n	n	n	n	n	%	n	n	n	n	n	n	%	n	%	n	%
15–19	M	4	3	75.0	–	–	–	–	–	1	–	1	25.0	–	–	–	–	–	–	0.0	–	0.0	1	25.0
	F	5	3	60.0	–	1	–	–	–	1	–	2	40.0	–	–	–	–	–	–	0.0	–	0.0	2	40.0
	M+F	9	6	66.7	–	1	–	–	–	2	–	3	33.3	–	–	–	–	–	–	0.0	–	0.0	3	33.0
20–29	M	22	14	63.6	–	2	–	1	2	1	1	7	31.8	–	–	–	–	–	–	0.0	1	4.5	8	36.4
	F	20	5	25.0	1	4	1	–	–	3	1	10	50.0	1	–	1	1	2	5	25.0	–	0.0	15	75.0
	M+F	42	19	45.2	1	6	1	1	2	4	2	17	40.5	1	–	1	1	2	5	11.9	1	2.4	23	54.8
30–39	M	26	8	30.8	1	7	–	–	–	3	–	11	42.3	3	1	–	–	2	5	19.2	2	7.7	18	69.2
	F	17	6	35.3	–	2	1	–	1	1	1	6	35.3	–	2	–	1	1	4	23.5	1	5.9	11	64.7
	M+F	43	14	32.6	1	9	1	–	1	4	1	17	39.5	3	3	–	1	3	9	20.9	3	7.0	29	67.4
40–59	M	13	3	23.1	1	2	1	–	–	2	–	6	46.2	–	1	–	–	1	2	15.4	2	15.4	10	76.9
	F	11	6	54.5	–	–	–	–	–	–	1	1	9.1	–	–	–	–	–	–	0.0	4	36.4	5	45.5
	M+F	24	9	37.5	1	2	1	–	–	2	1	7	29.2	–	1	–	–	1	2	8.3	6	25.0	15	62.5
Total	M	65	28	43.1	2	11	1	1	2	7	1	25	38.5	3	2	–	–	3	7	10.8	5	7.7	37	56.9
	F	53	20	37.7	1	7	2	–	1	5	3	19	35.8	1	2	1	2	3	9	17.0	5	9.4	33	62.3
	M+F	118	48	40.7	3	18	3	1	3	12	4	44	37.3	4	4	1	2	6	16	13.6	10	8.5	70	59.3

Explanations:
+ = degrees according to Brothwell (1963)
UL = upper lateral teeth
LL = lower lateral teeth
BL = both lateral teeth
UF = upper frontal teeth
LF = lower frontal teeth
LJ = lower jaw
BJ = both jaws
M = males
F = females

Tab. 15:12 Degree of Resorption of the Alveolar Process according to Age and Sex

Age group	Sex	No. of individuals	0		1+		2+		3+	
			n	%	n	%	n	%	n	%
15–19	M	4	2	50.0	2	50.0	–	0.0	–	0.0
	F	6	5	83.3	1	16.7	–	0.0	–	0.0
	M+F	10	7	70.0	3	30.0	–	0.0	–	0.0
20–29	M	21	–	0.0	12	57.1	8	38.1	1	4.8
	F	20	3	15.0	11	55.0	6	30.0	–	0.0
	M+F	41	3	7.3	23	56.1	14	34.1	1	2.4
30–39	M	26	–	0.0	1	3.8	15	57.7	10	38.5
	F	20	–	0.0	5	25.0	9	45.0	6	30.0
	M+F	46	–	0.0	6	13.0	24	52.2	16	34.8
40–59	M	17	–	0.0	–	0.0	10	58.8	7	41.2
	F	13	–	0.0	–	0.0	8	61.5	5	38.5
	M+F	30	–	0.0	–	0.0	18	60.0	12	40.0
Total	M	68	2	2.9	15	22.1	33	48.5	18	26.5
	F	59	8	13.6	17	28.8	23	39.0	11	18.6
	M+F	127	10	7.9	32	25.2	56	44.1	29	22.8

Explanations:
+ = degrees according to Brothwell (1963)
M = males
F = females

Tab. 15:13 Atrophy of the Jaws according to Age and Sex

Age group	Sex	No. of individuals	No atrophy		Only maxilla						Only mandible						Both jaws						Total	
					1		2		3		1		2		3		1		2		3			
			n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
15–19	M	4	4	100.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
	F	6	6	100.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
	M+F	10	10	100.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
20–29	M	21	18	85.7	1	4.8	—	0.0	1	4.8	—	0.0	1	4.8	—	0.0	—	0.0	—	0.0	—	0.0	3	14.3
	F	21	21	100.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0
	M+F	42	39	92.9	1	2.4	—	0.0	1	2.4	—	0.0	1	2.4	—	0.0	—	0.0	—	0.0	—	0.0	3	7.1
30–39	M	27	22	81.5	2	7.4	1	3.7	1	3.7	1	3.7	—	0.0	—	0.0	—	0.0	—	0.0	—	0.0	5	18.5
	F	20	12	60.0	—	0.0	2	10.0	1	5.0	2	10.0	—	0.0	1	5.0	1	5.0	1	5.0	—	0.0	8	40.0
	M+F	47	34	72.3	2	4.3	3	6.4	2	4.3	3	6.4	—	0.0	1	2.1	1	2.1	1	2.1	—	0.0	13	27.7
40–59	M	21	7	33.3	—	0.0	2	9.5	2	9.5	2	9.5	3	14.3	1	4.8	—	0.0	3	14.3	1	4.8	14	66.7
	F	14	5	35.7	—	0.0	1	7.1	1	7.1	1	7.1	2	14.3	1	7.1	—	0.0	—	0.0	3	21.4	9	64.3
	M+F	35	12	34.3	—	0.0	3	8.6	3	8.6	3	8.6	5	14.3	2	5.7	—	0.0	3	8.6	4	11.4	23	65.7
Total	M	73	51	69.9	3	4.1	3	4.1	4	5.5	3	4.1	4	5.5	1	1.4	—	0.0	3	4.1	1	1.4	22	30.1
	F	61	44	72.1	—	0.0	3	4.9	2	3.3	3	4.9	2	3.3	2	3.3	1	1.6	1	1.6	3	4.9	17	27.9
	M+F	134	95	70.9	3	2.2	6	4.5	6	4.5	6	4.5	6	4.5	3	2.2	1	0.7	4	3.0	4	3.0	39	29.1

Explanations:
0 = no atrophy
1 = atrophy limited to an area with two or more intravital losses
2 = partial atrophy (usually one or both lateral parts, once frontal part)
3 = total atrophy

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PLATE 1

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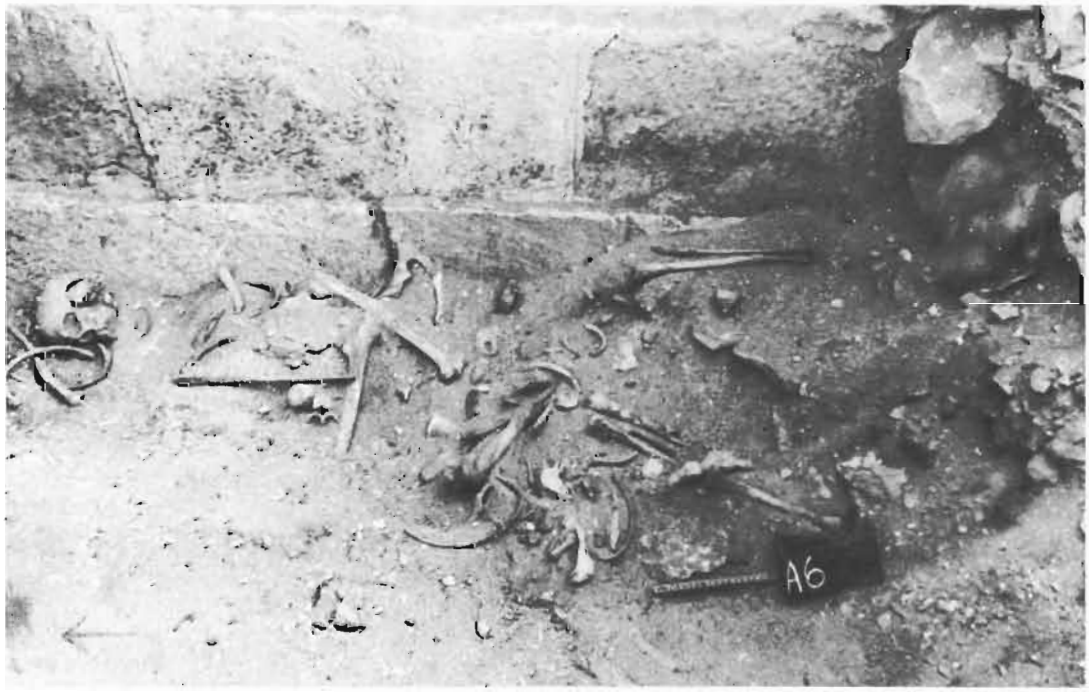
2



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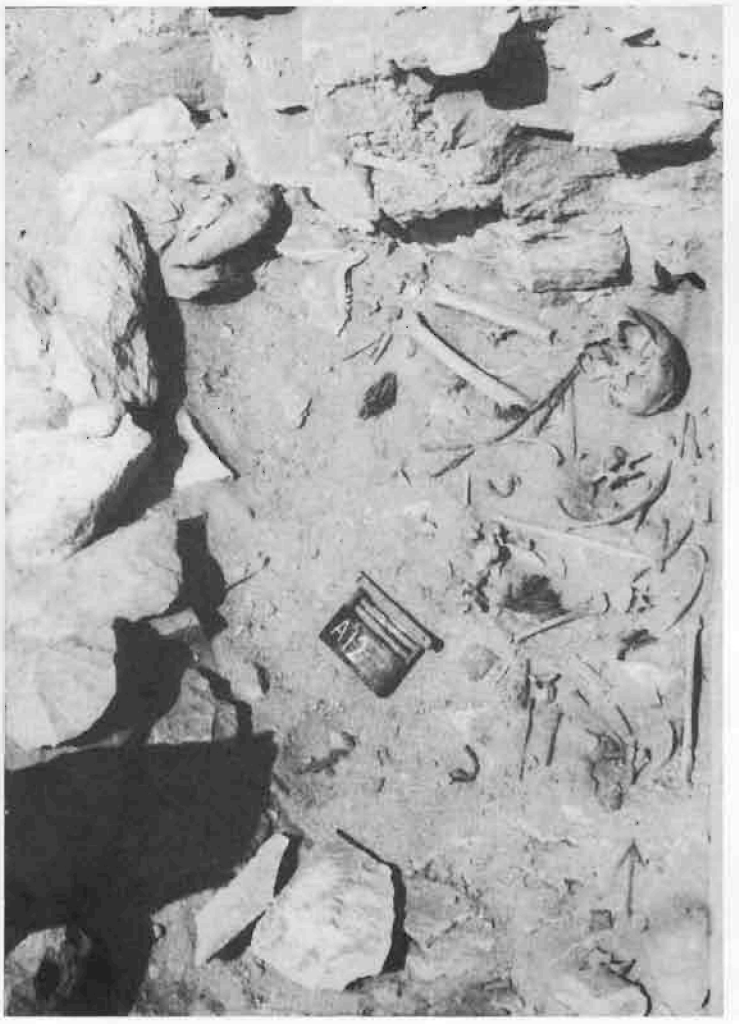

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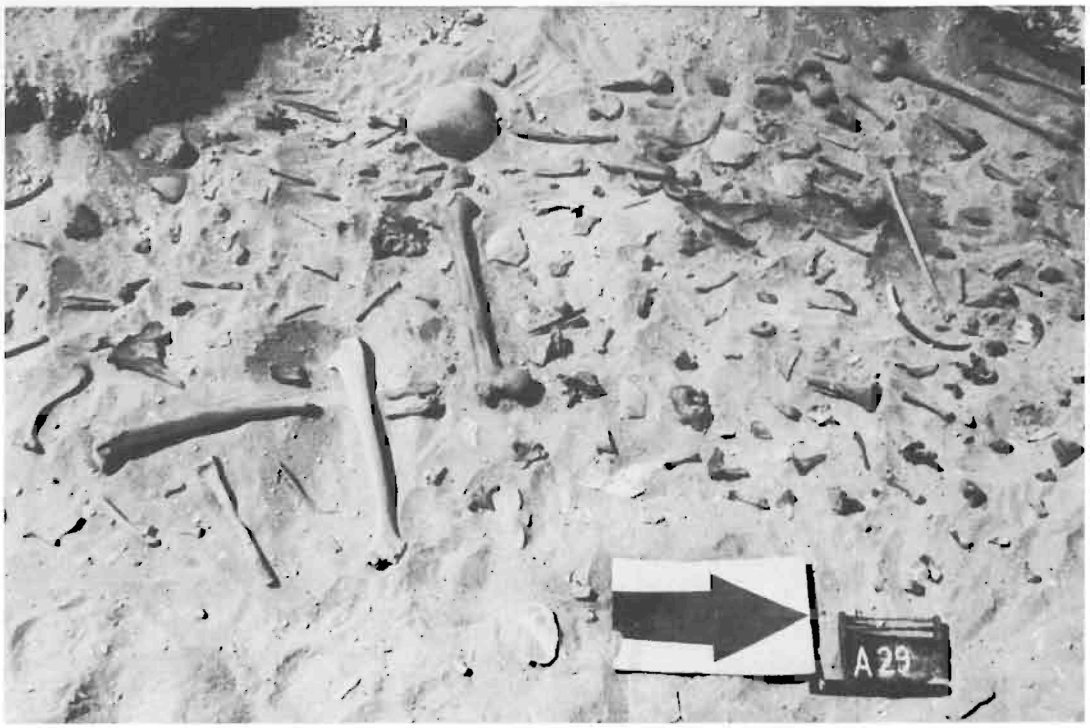

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PLATE 5

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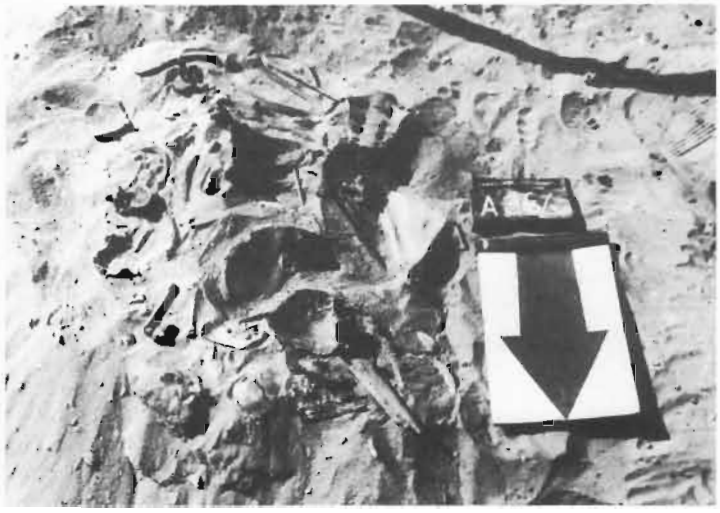

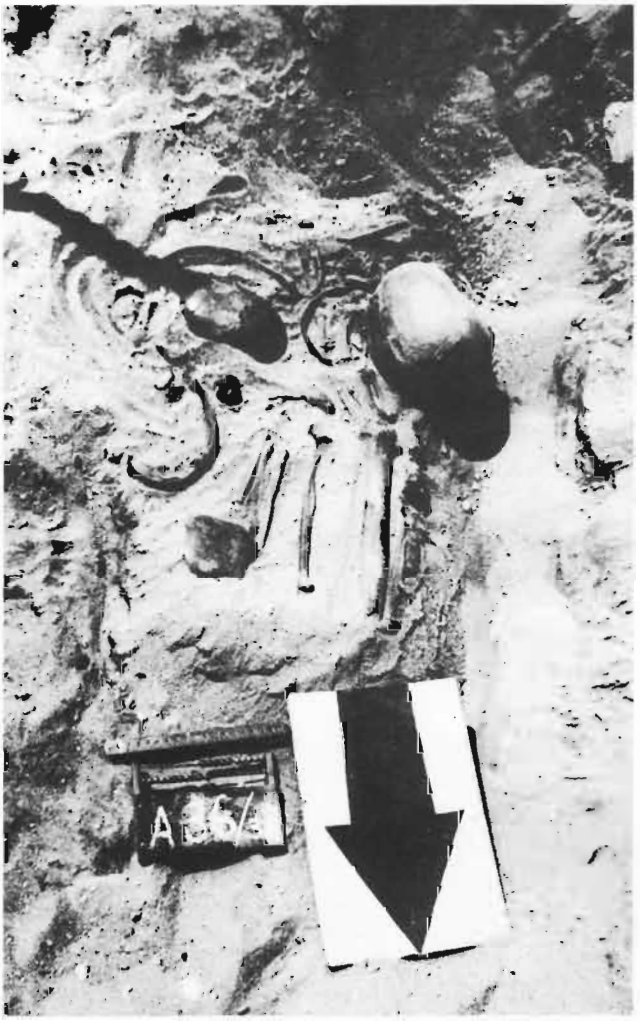

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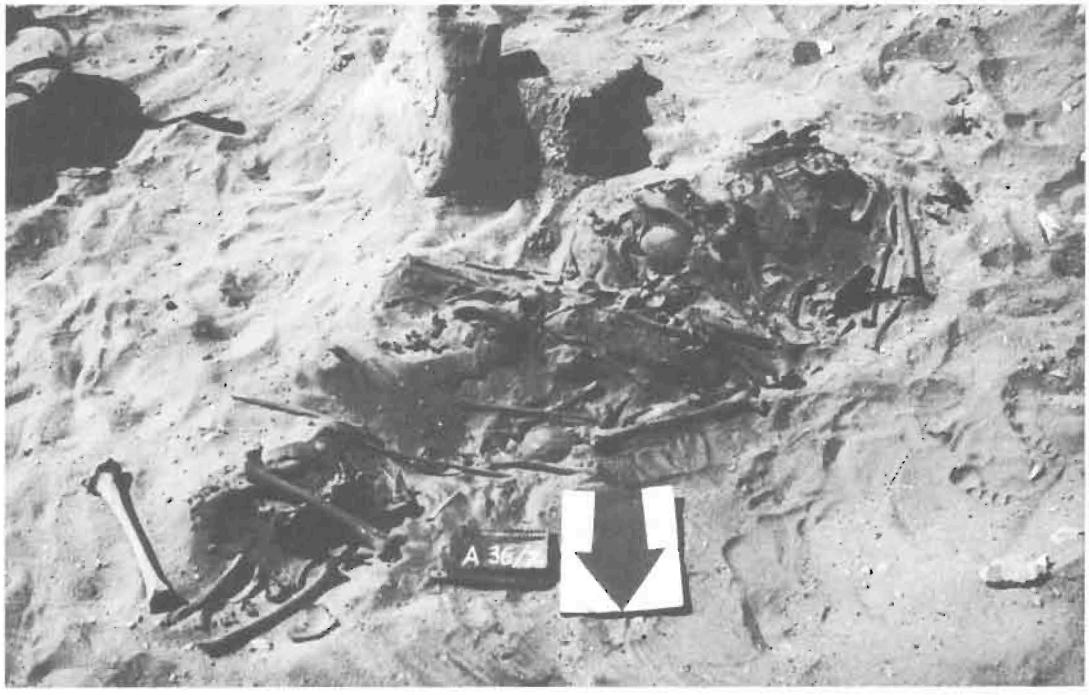

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PLATE 7

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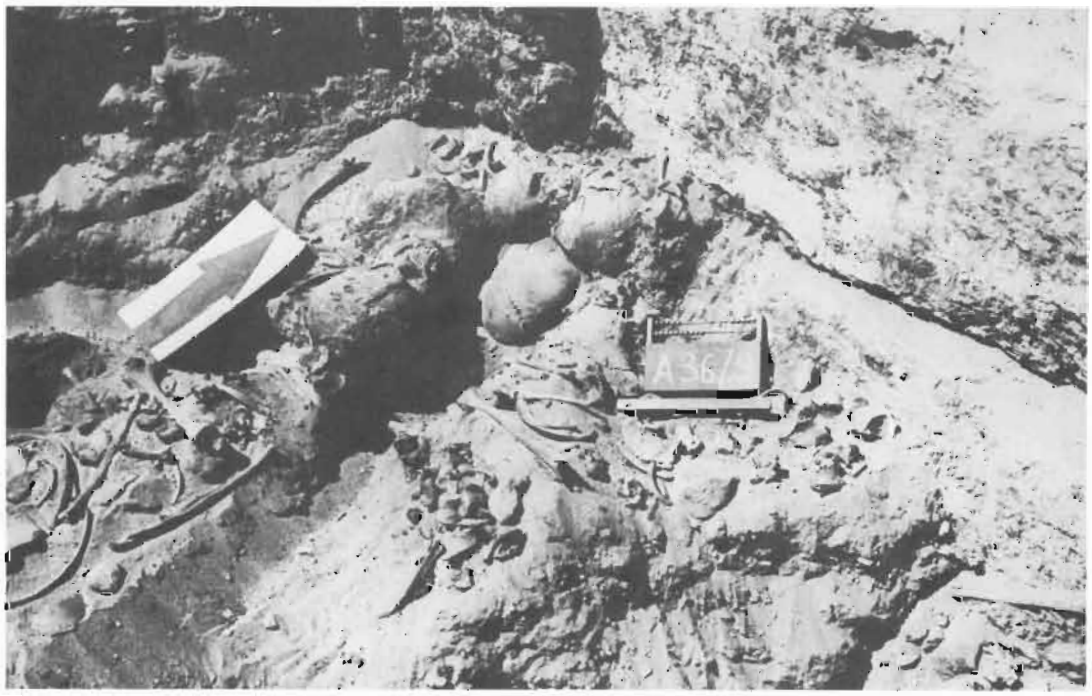

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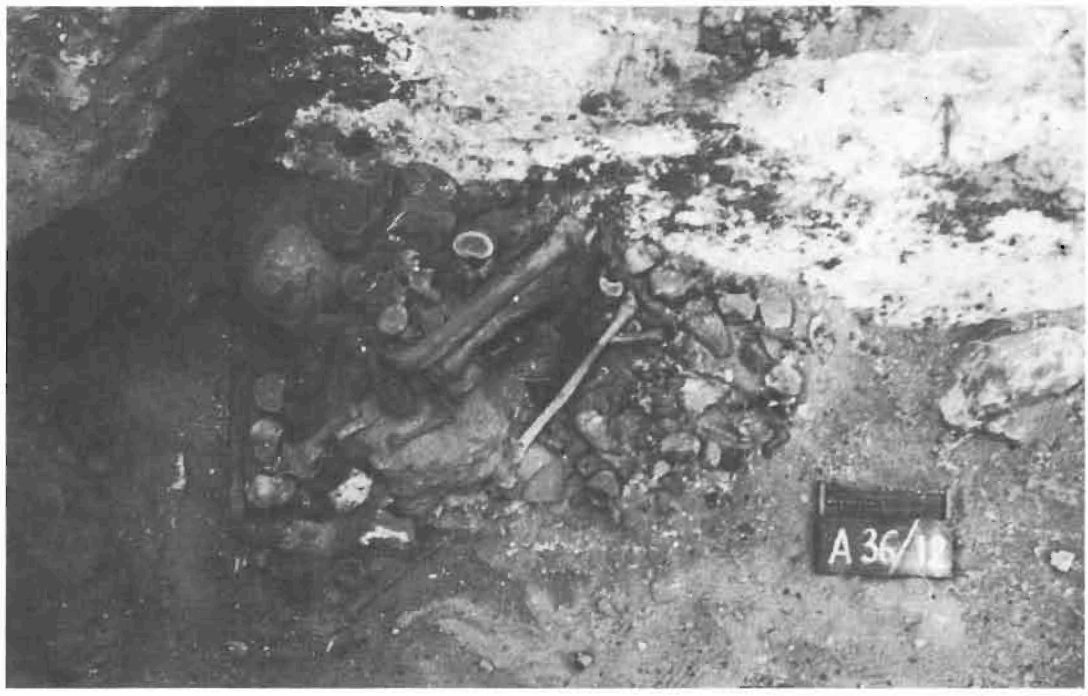
1. Bone deposit A 36/8
2. Bone deposit A 36/9
3. Bone deposit A 36/10

1

2



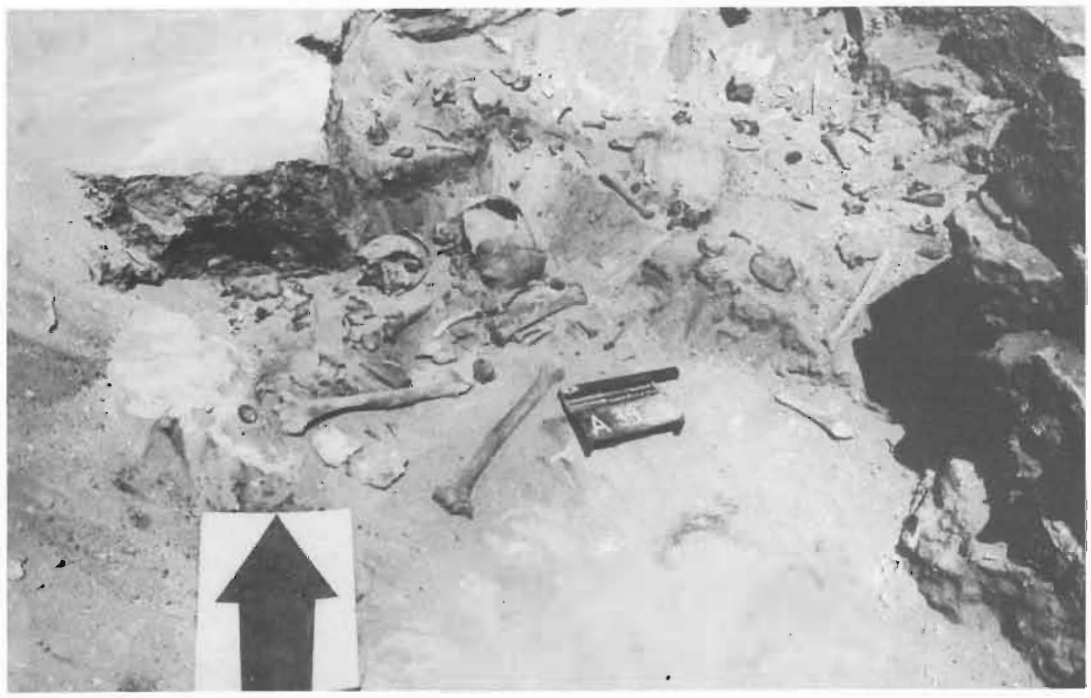
3

1. Bone deposit A 36/11
2. Bone deposit A 36/12
3. Bone deposit A 36/13 (a ja with bones of a child)

PLATE 9

1

2



3

1. Bone deposit A 38
2. Bone deposit A 39
3. Bone deposit A 40

1

2

1. Bone deposit A 44/1
2. Bone deposit A 44/2

PLATE 11

1

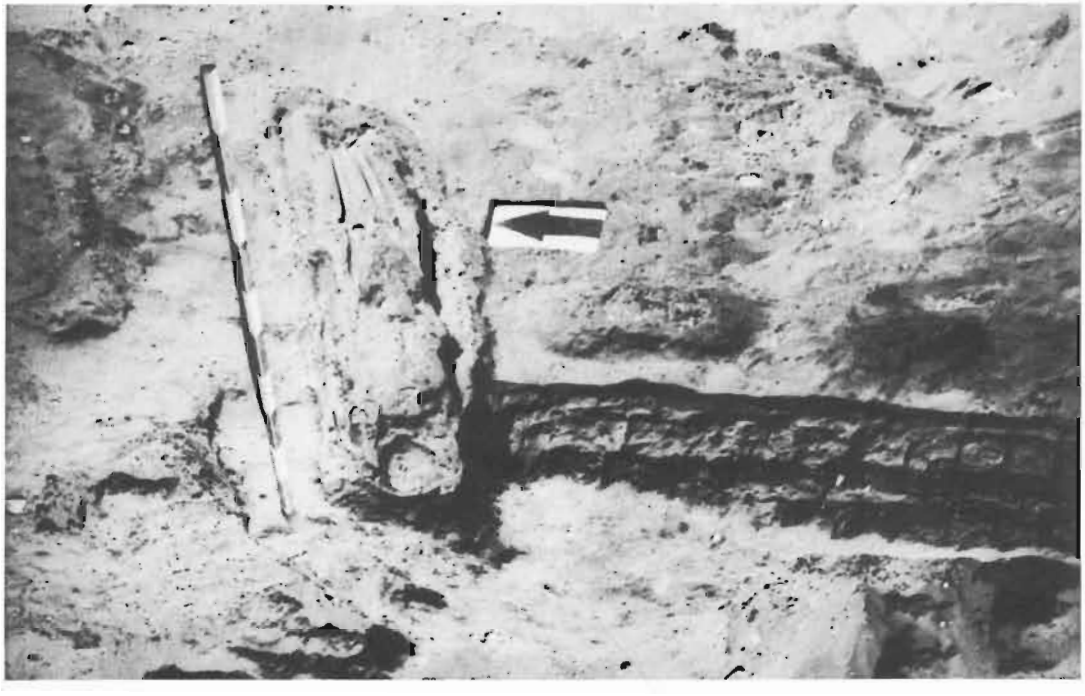
2

1. Burial D 123 and left humerus
of the scattered burial D 125
2. Burial D 130 a (right) and D 130 b (left)

1

2

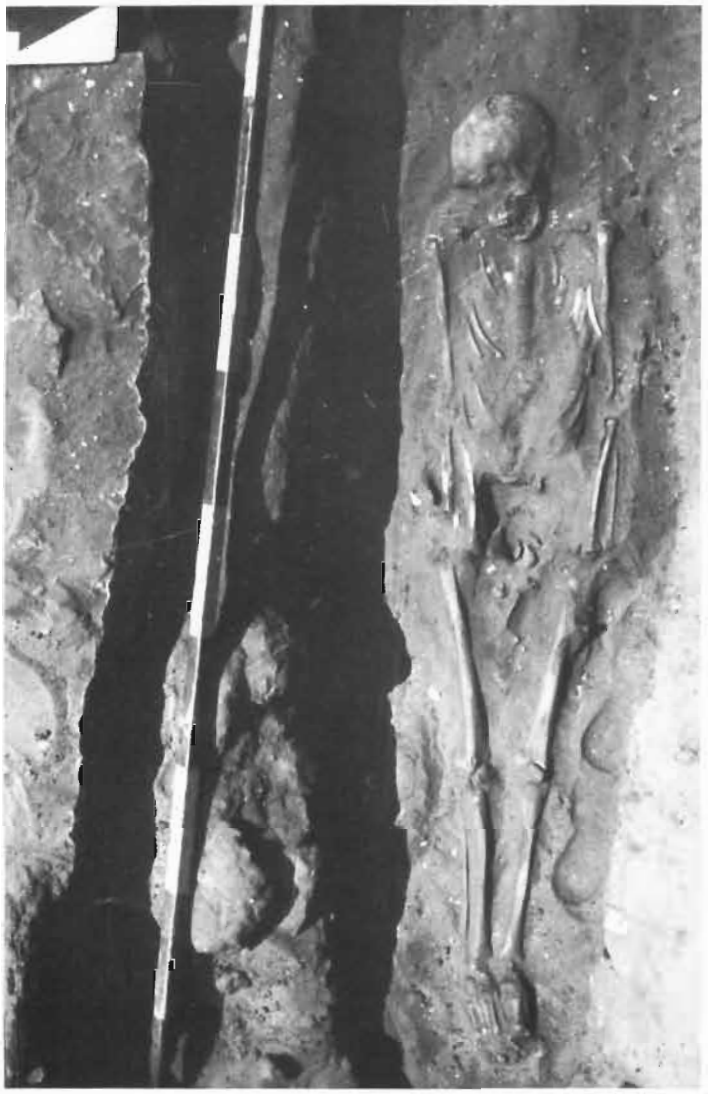
3



1. Burial I 287 (detail of the head)
2. Burial I 305
3. Burial I 316 (left) and I 317 (right

1

2



3

1. Burial I 323
2. Burial I 324
3. Burial I 382

1

2

3

1. Burial I 386
2. Burial I 387 (detail of the head with a vessel)
3. Burial I 393

1

2

3

1. Burial I 403
2. Burial I 405
3. Burial I 407

1

2

3

1. Burial I 414
2. Burial I 495 (detail of the head)
3. Burial I 417

1

2

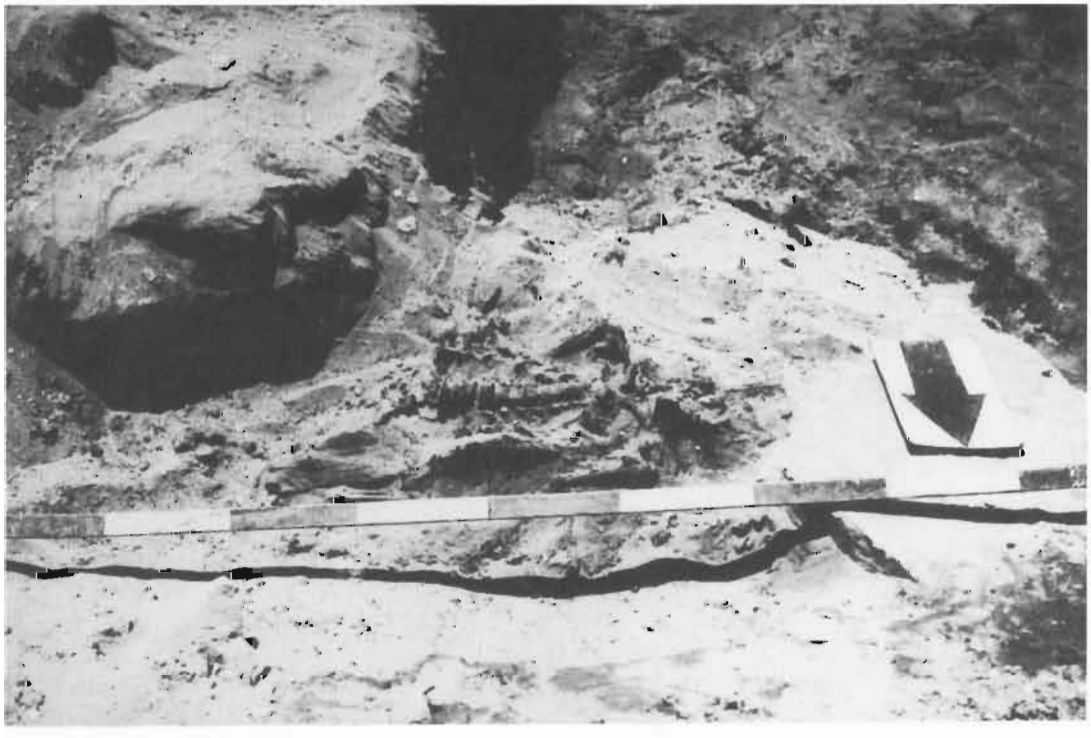
3

1. Burial I 452 (detail of the head)
2. Burial I 453 (detail of the head)
3. Burial I 461

1

2

3

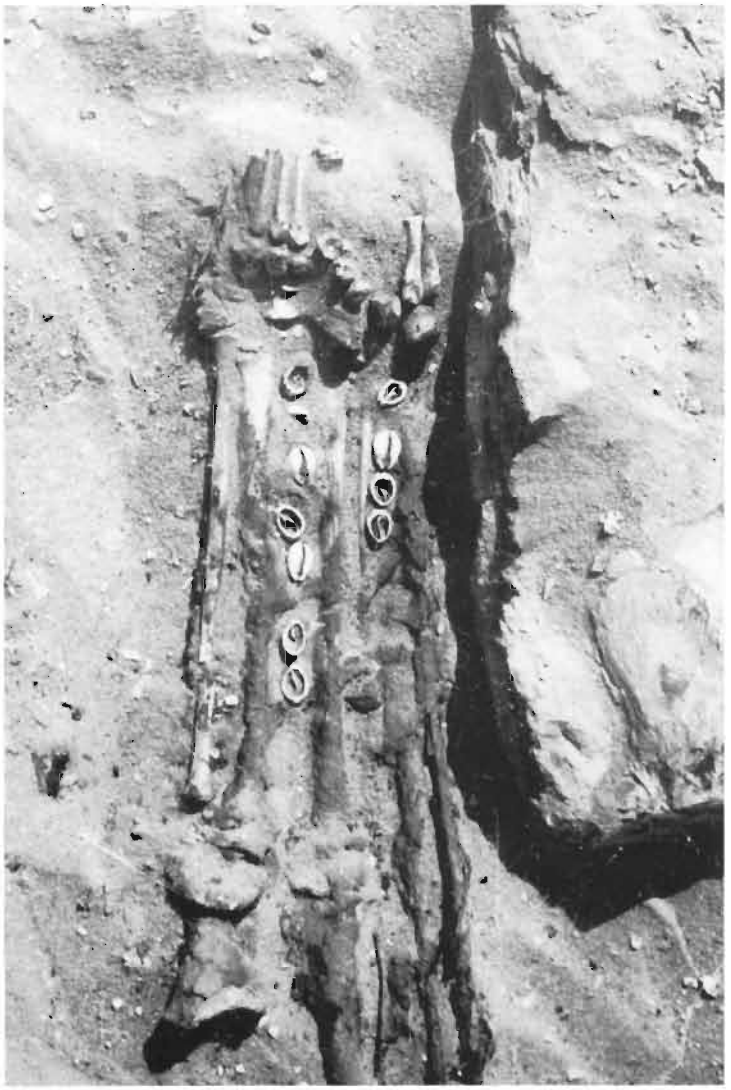


1. Burial I 462
2. Burial J 394
3. Burial J 1483

PLATE 19

1

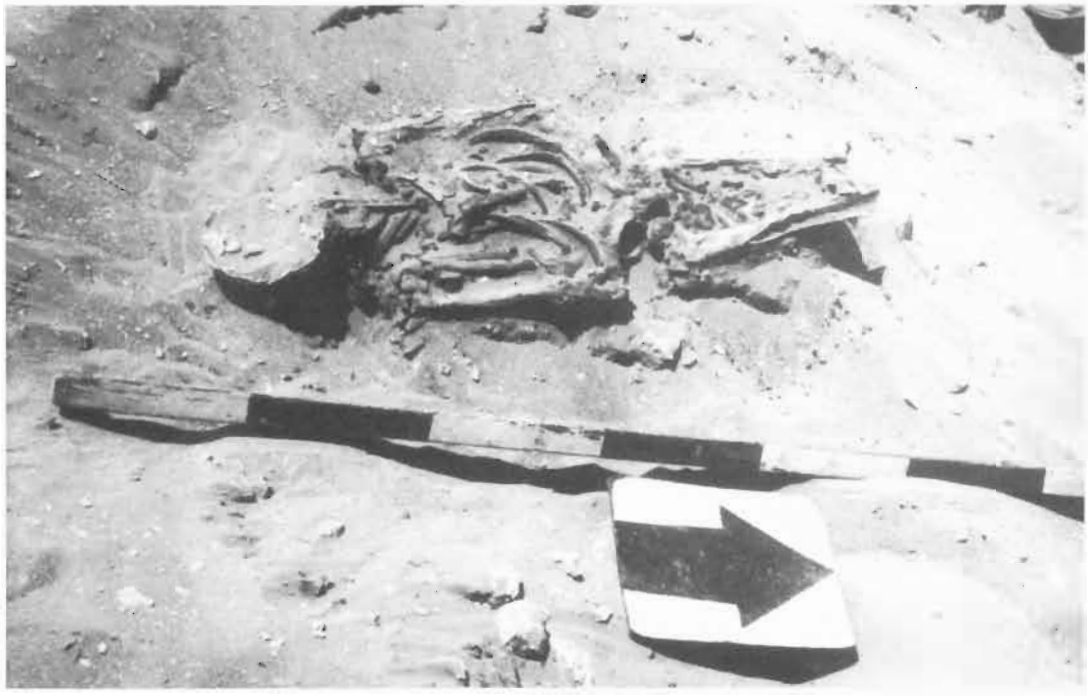
2



3

1. Burial J 1553
2. Burial J 1553 (detail of the legs)
3. Burial J 1606

1

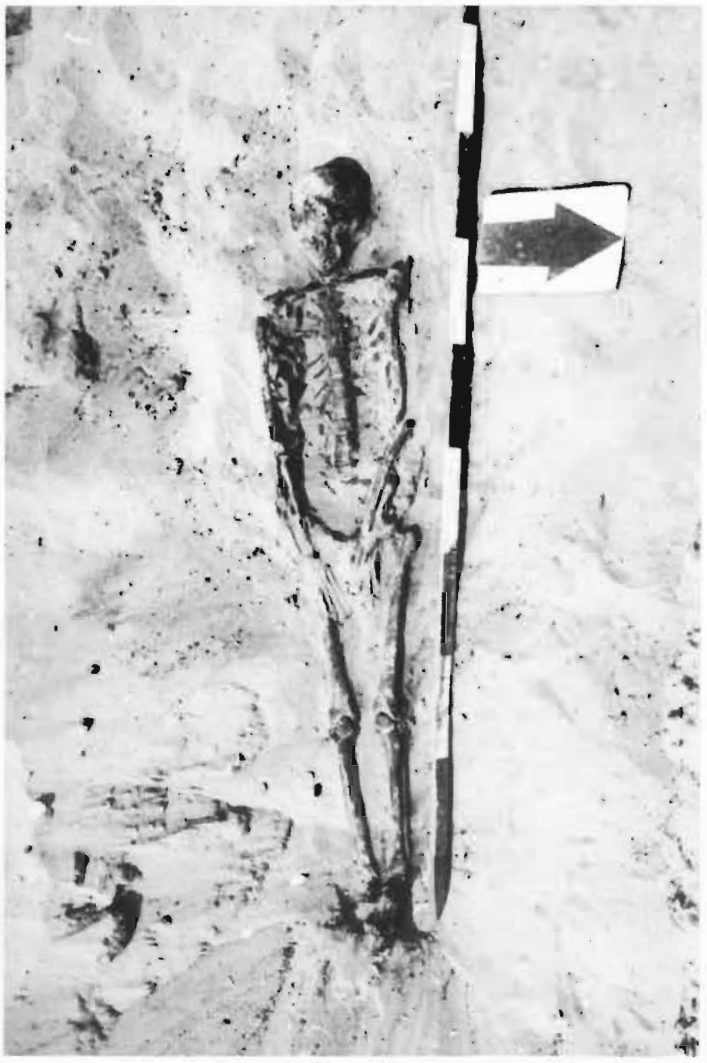


2

3

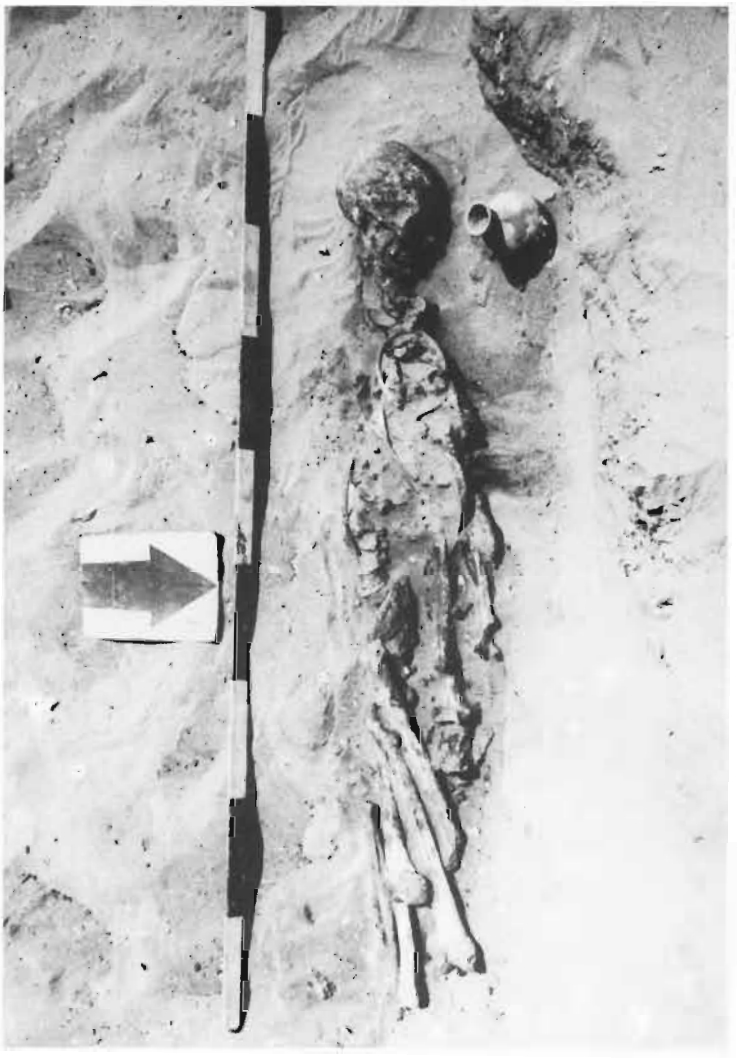
1. Burial J 1744
2. Burial J 1761
3. Burial J 1885

1



2

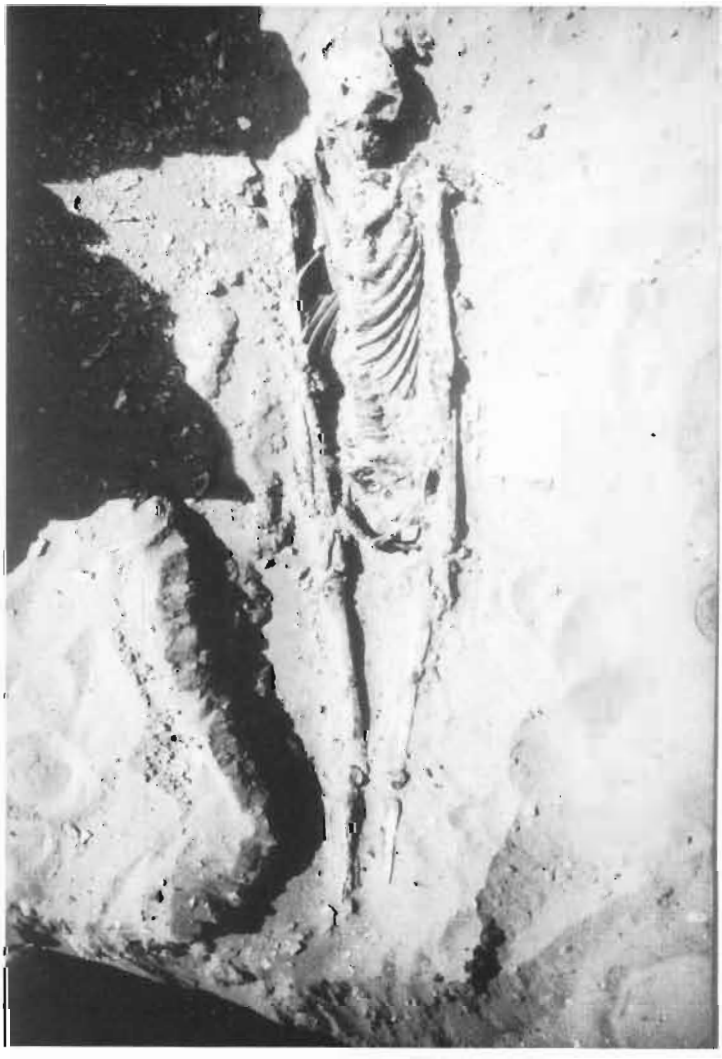
3



1. Burial J 1891
2. Burial J 1892
3. Burial J 1894

1

2

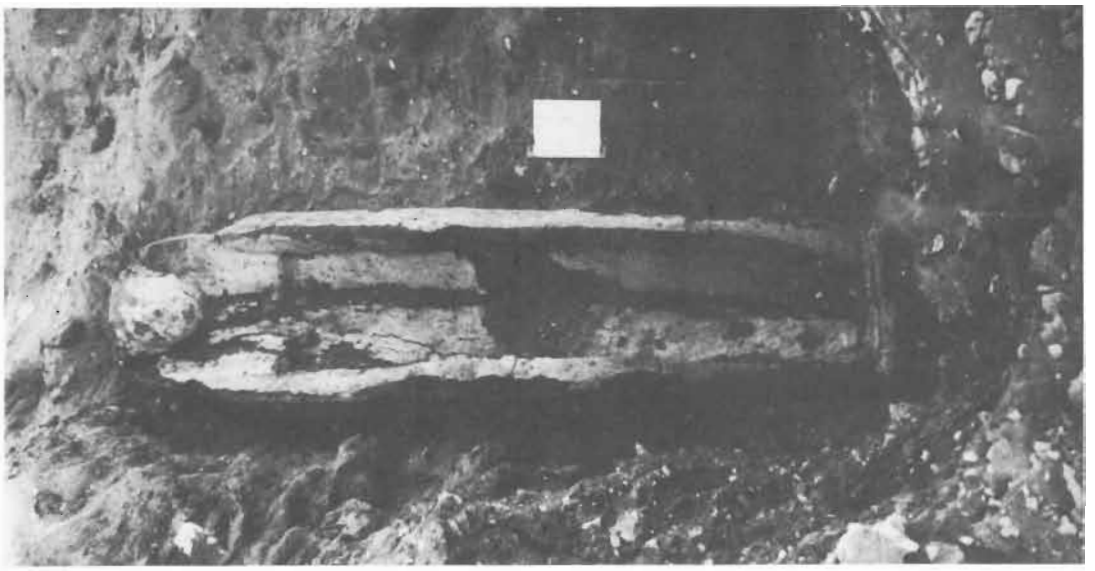


3

1. Burial J 1896
2. Burial J 1946
3. Burial J 1947

PLATE 23

1



2

3

1. Anthropoid coffin I 403
2. Anthropoid coffin I 457
3. Anthropoid coffin I 462

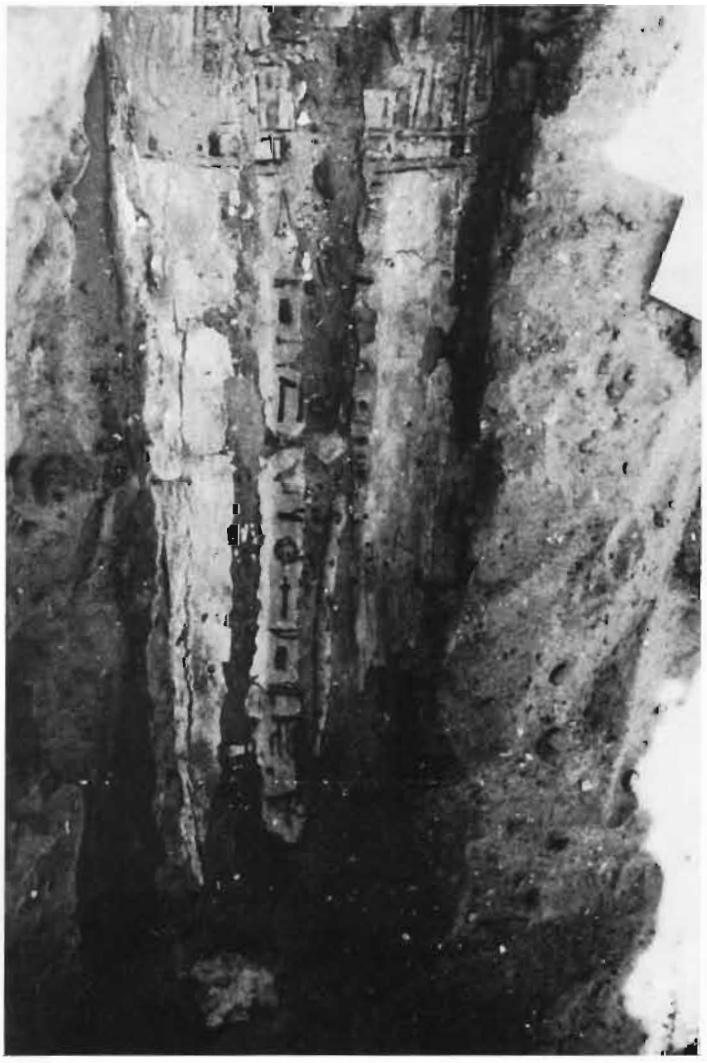
1

2

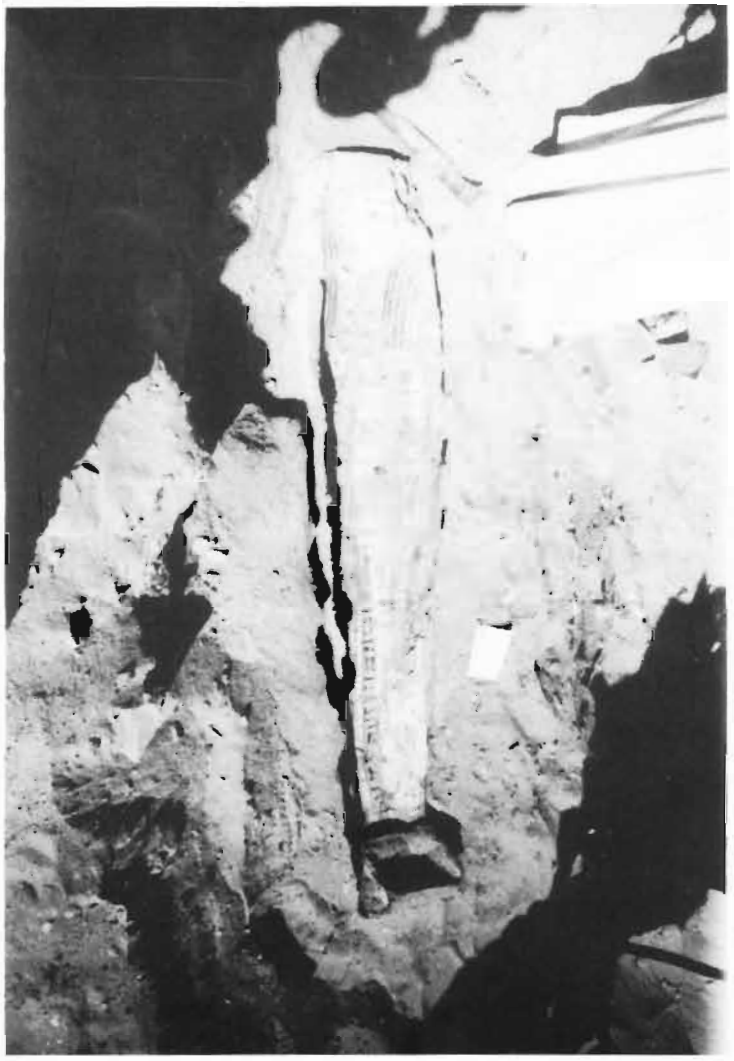
3

1. Fragment of anthropoid coffin I 273
2. Anthropoid coffin I 384 (details of the decoration and inscription)
3. Anthropoid coffin I 393 (details of the head and shoulders)

1



2



3

1. Anthropoid coffin I 393 (detail of the inscription)
2. Anthropoid coffin I 406
3. Anthropoid coffin I 406 (detail of the inscription)

1

2

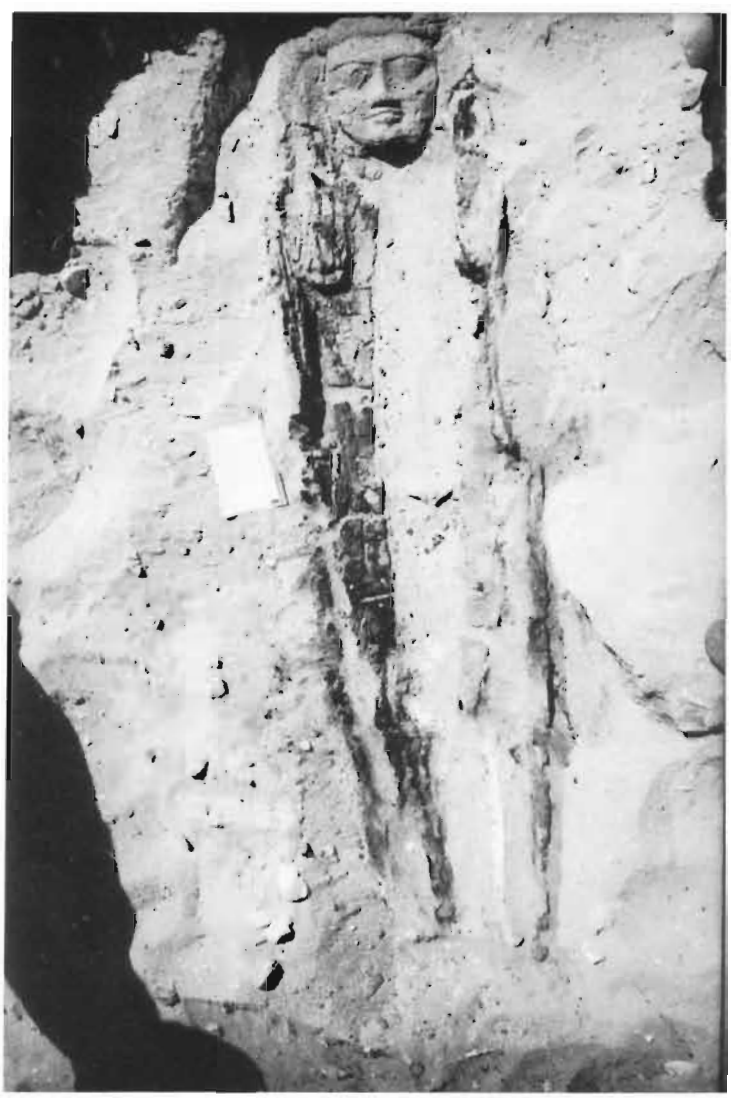
3

1. Anthropoid coffin I 407
2. Anthropoid coffin I 412
3. Anthropoid coffin I 456

2

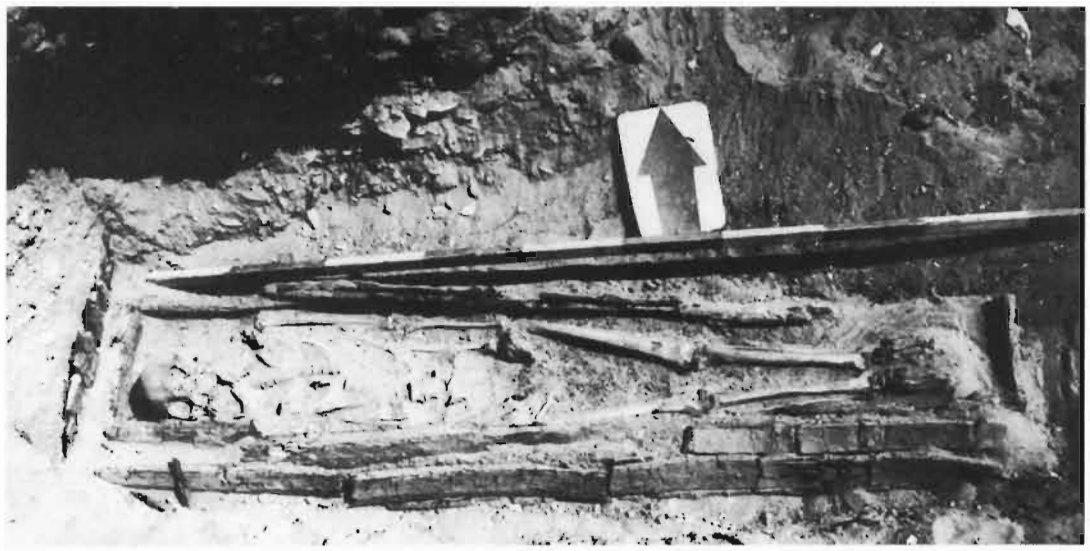
1

3



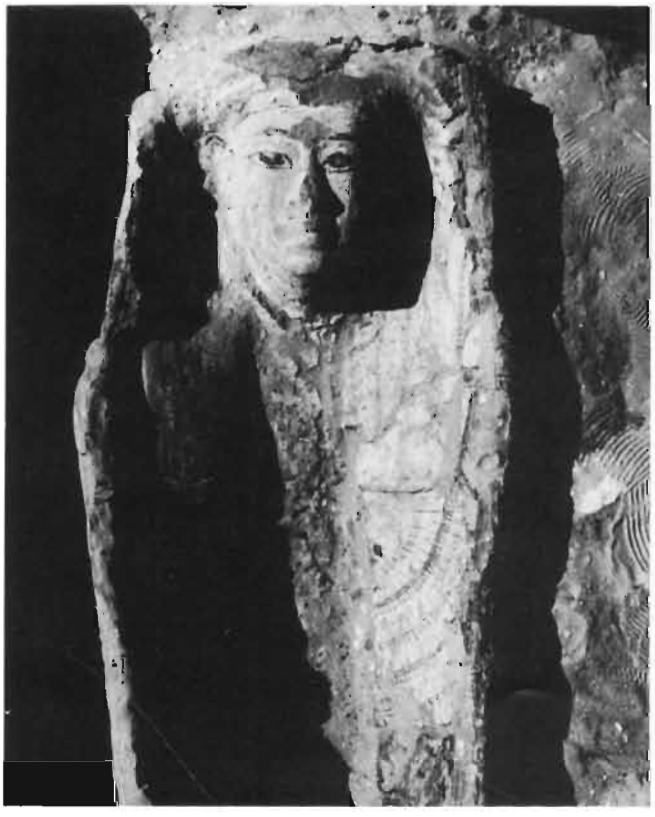
1. Anthropoid coffin I 456 (detail of the inscription)
2. Anthropoid coffin J 1628
3. Anthropoid coffin J 1947

1



2

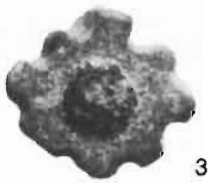
3



1. Double-coffin I 383 (detail of the decoration)
2. Double-coffin J 1807
3. Double-coffin D 334 (detail of the decoration)

1

2



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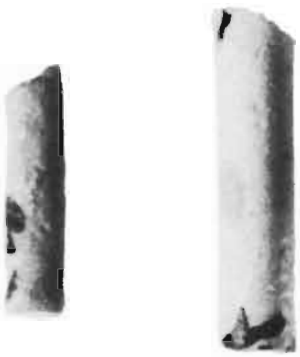
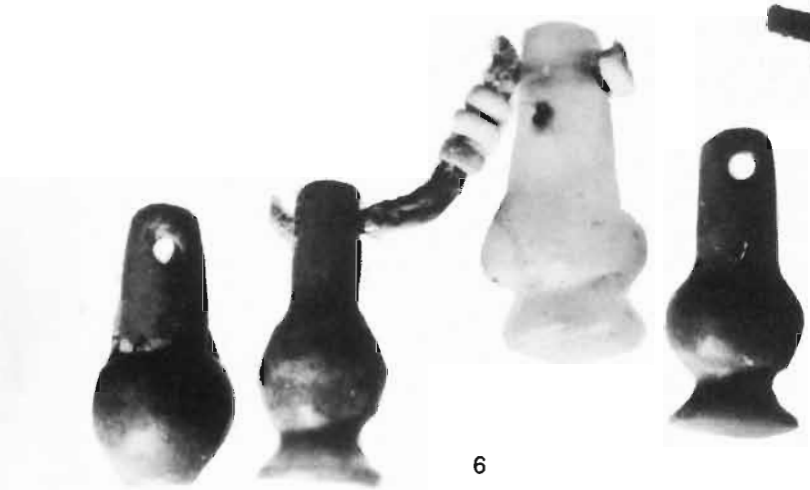


5

4

7

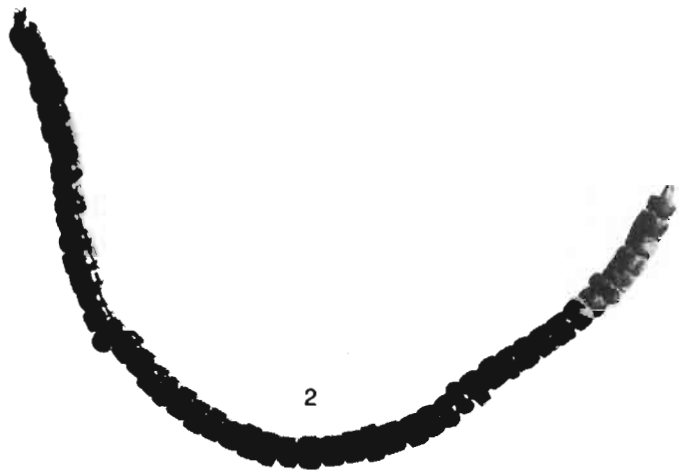


6

8

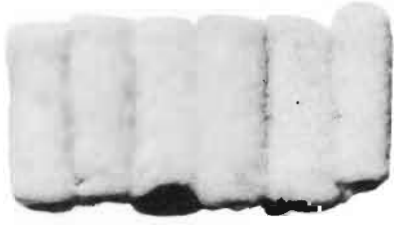
1. Bead E 1068 – P 5394
2. Beads E 1133 – P 5395 a
3. Bead E 1133 – P 5395 b
4. Bead E 1509
5. Beads E 2169 – P 5367 b, c, d
6. Beads F 113
7. Beads F 115 – P 5401
8. Beads F 116 – P 5402

1



2

3



4

5

1. Necklace F 134 B — P 5404
2. Necklace F 152 — P 5405
3. Necklace F 296 d — P 5409
4. Pendant F 296 e — P 5409
5. Necklace I 305 a — P 5423

1

2

3

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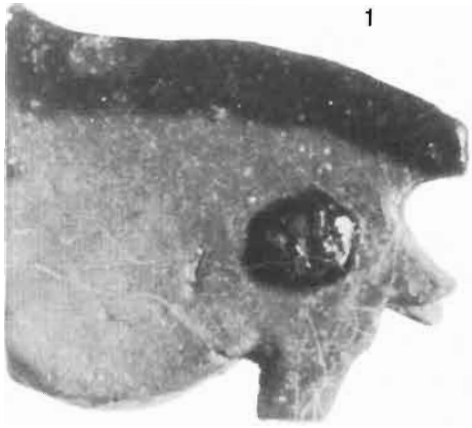
9

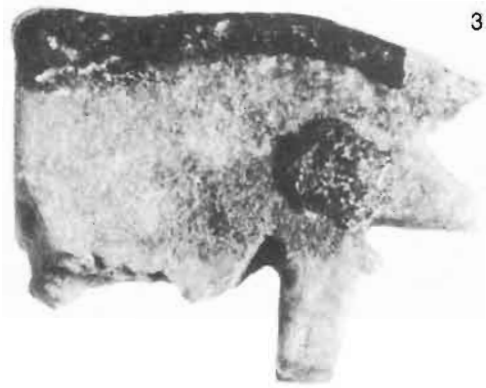
10

11

1. Pataikos amulet E 1182, front
2. Pataikos amulet E 1182, back
3. Bes-djed amulet E 2126
4. Deity amulet E 2153 — P 5346, lateral
5. Cat amulet E 2704 — P 5352 b, front
6. Cat amulet E 2704 — P 5352 b, lateral
7. Schematic Isis-and-Horus amulet E 2704 — P 5352 c, front
8. Schematic Isis-and-Horus amulet E 2704 — P 5352 c, lateral
9. Anubis amulet F 135 a
10. Horus amulet F 135 b
11. Cat amulet F 135 c


1

2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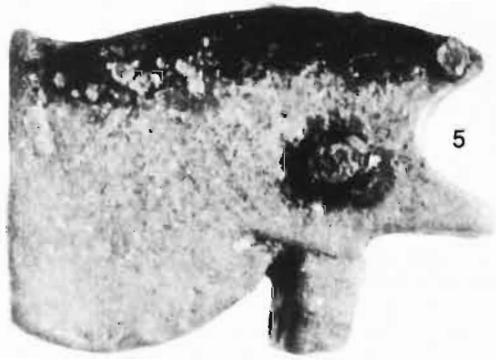
4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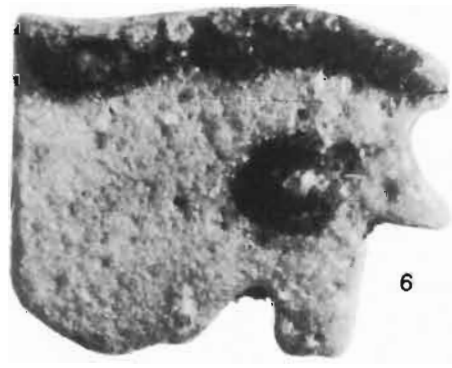
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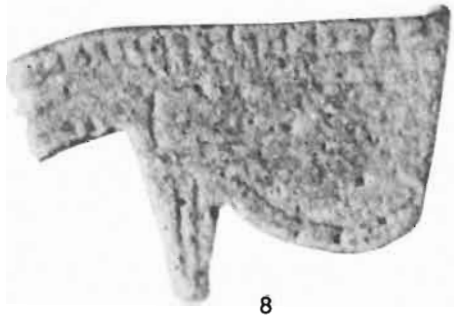
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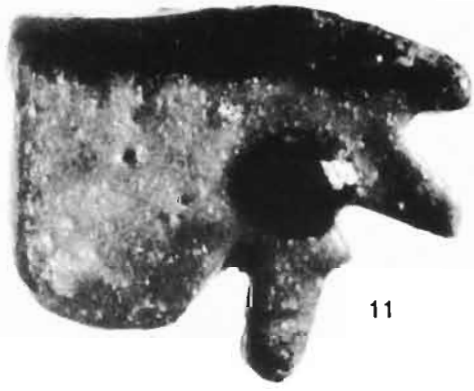
9

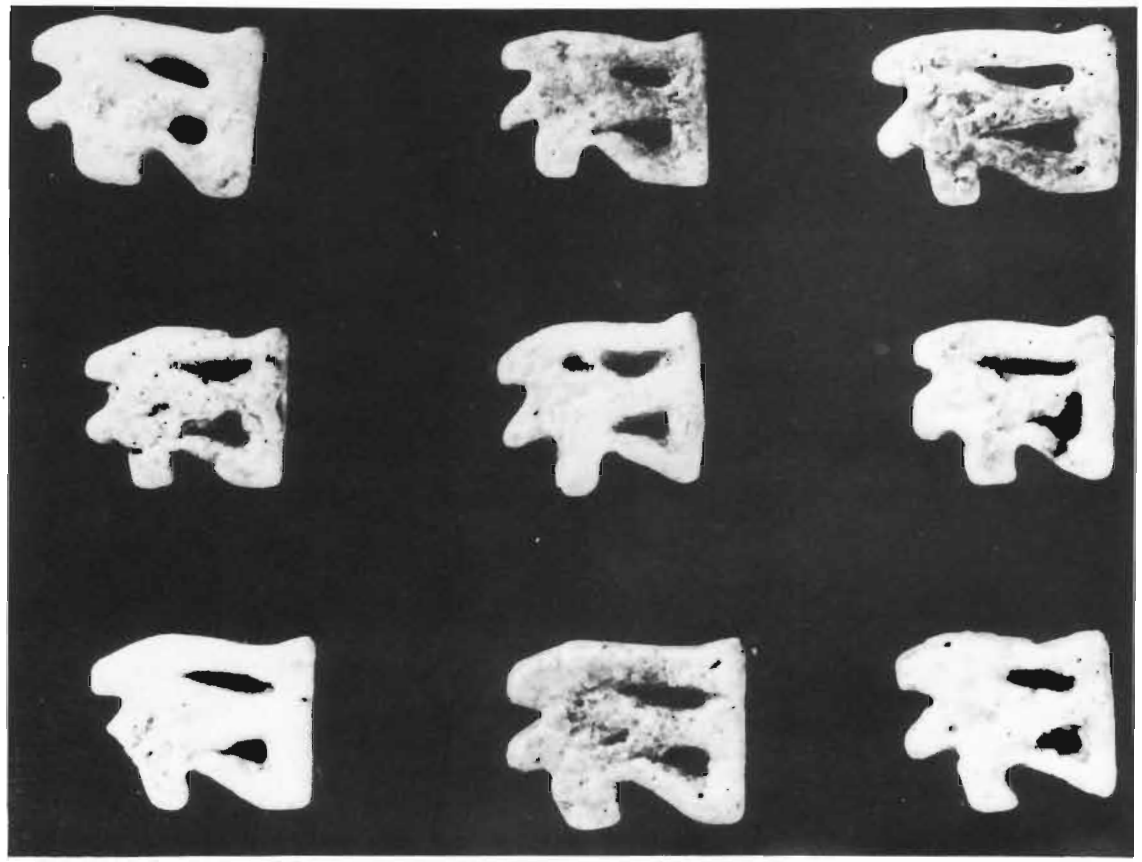
10


11

12

1. Udjat amulet E 1262 — P 5343
2. Udjat amulet E 1521 — P 5365 a
3. Udjat amulet E 1547 — P 5344
4. Udjat amulet E 2026 — P 5366
5. Udjat amulet E 2134 — P 5345
6. Udjat amulet E 2154 — P 5347
7. Udjat amulet E 2169 — P 5367 a
8. Udjat amulet E 2207 — P 5368 a
9. Udjat amulet E 2337 — P 5348
10. Udjat amulet E 2517 — P 5350
11. Udjat amulet E 2698 — P 5351
12. Udjat amulet E 2704 — P 5352 a

1



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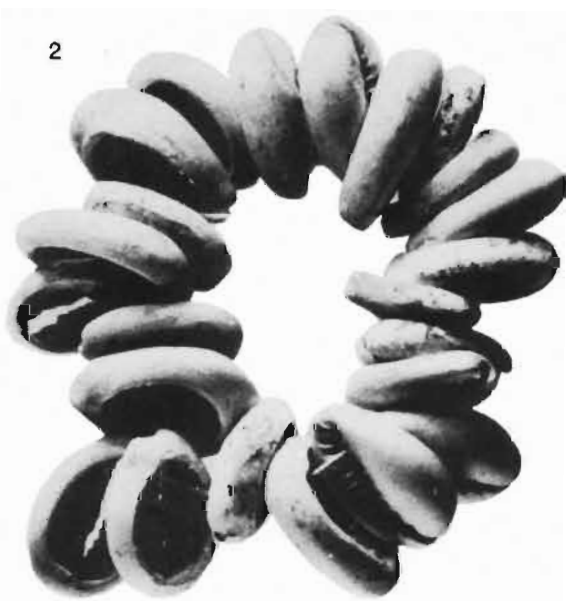
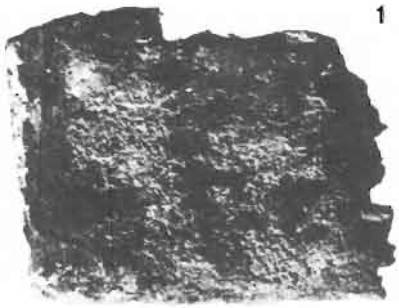
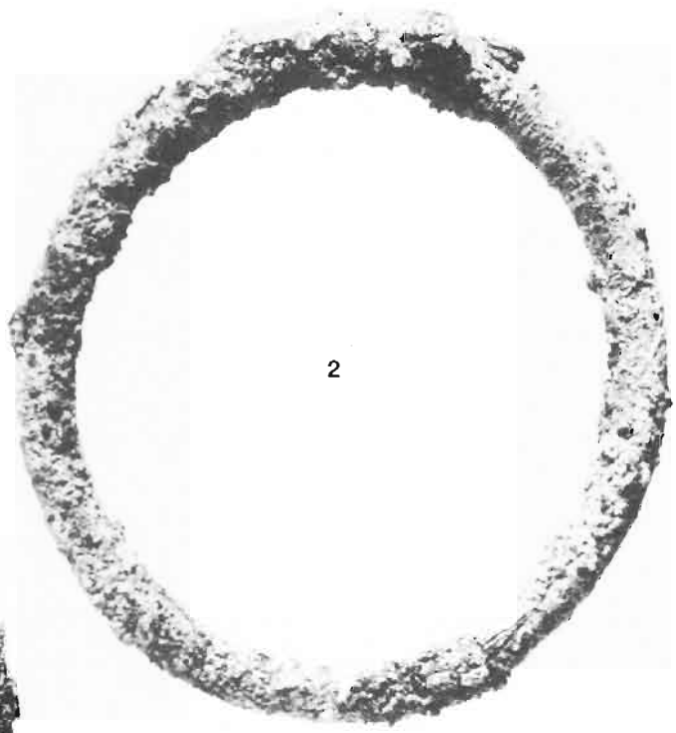


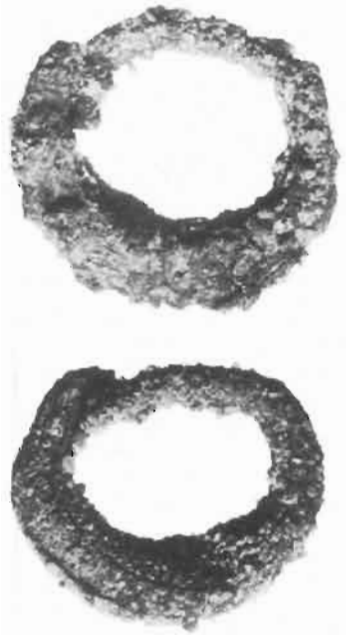
3

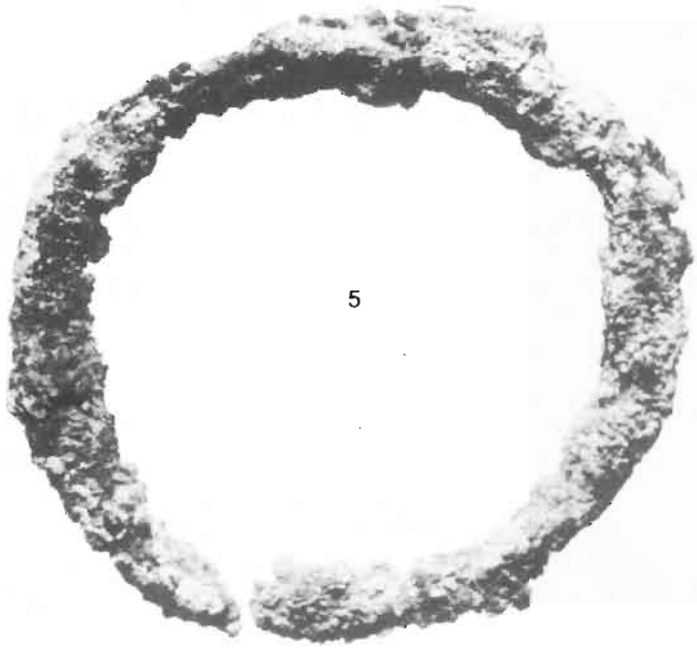
4

1. Nine udjat amulets I 273 b
2. Necklace of 24 cowrie shells I 305 — P 5424 c
3. Uadj amulet I 313 — P 5381 a
4. Pendant J 1950 — P 5437









1. Copper plate F 134 C — P 5297
2. Copper bracelet I 327 — P 5308
3. A child's copper bracelet I 387 — P 5312
4. A child's copper ear-rings I 465 — P 5314
5. Coper ring or ear-ring J 1970 — P 5326

PLATE 35

1

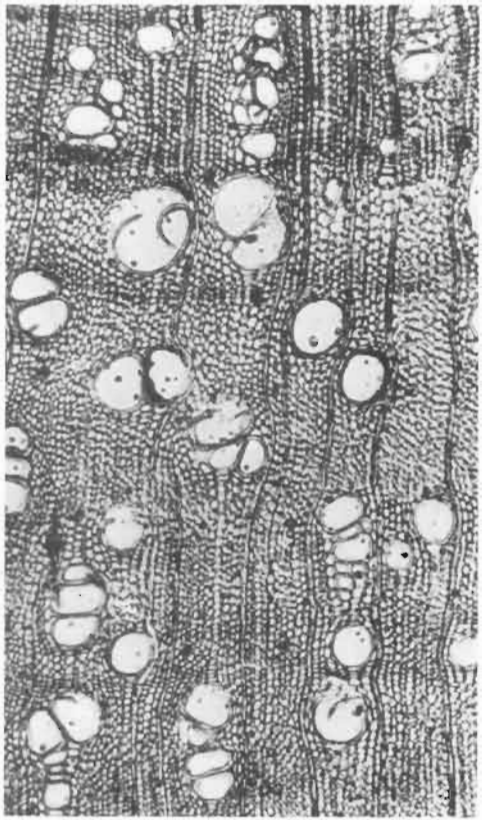
2

3

4

1. Limestone headrest F 131
2. Shell of Aspatharia arcuata Caill. F 167
3. Organic remains and remnants of wrappings A 36/12 — thin section (x 30)
4. Fibres of linen wrappings A 36/12 — thin section (x 150)

1



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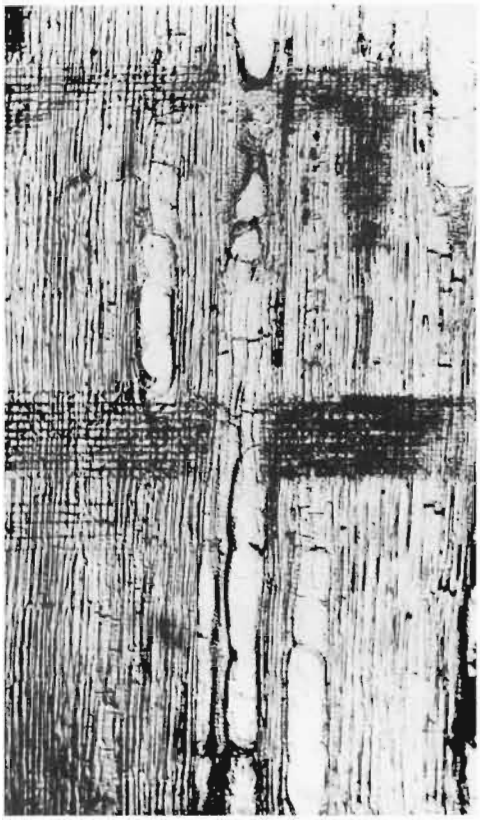

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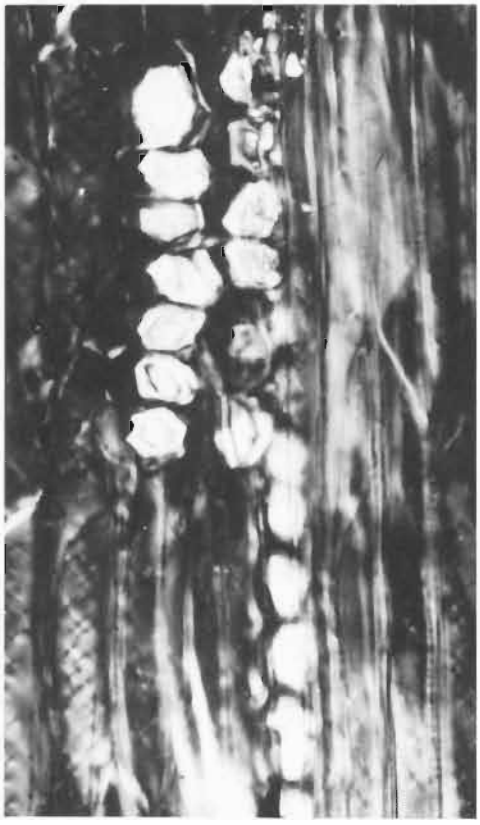


4

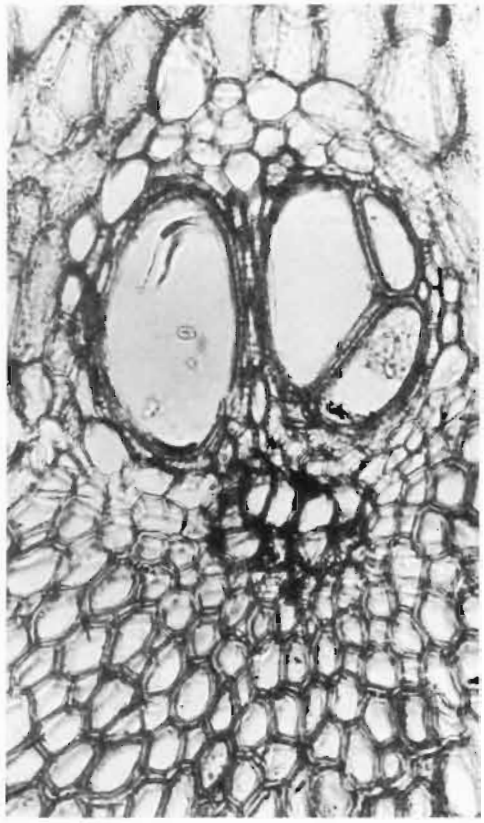
5

6

1—3. Thin sections of Acacia arabica Willd.
4—6. Thin sections of Ficus sycomorus L.

1

2



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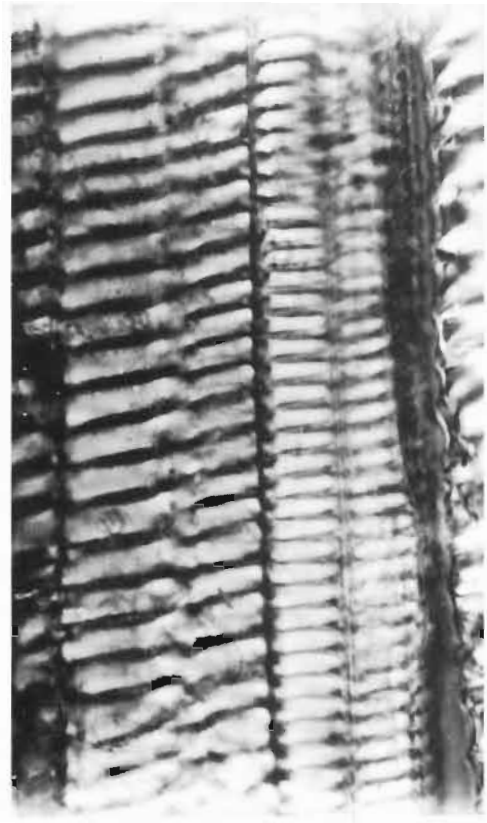

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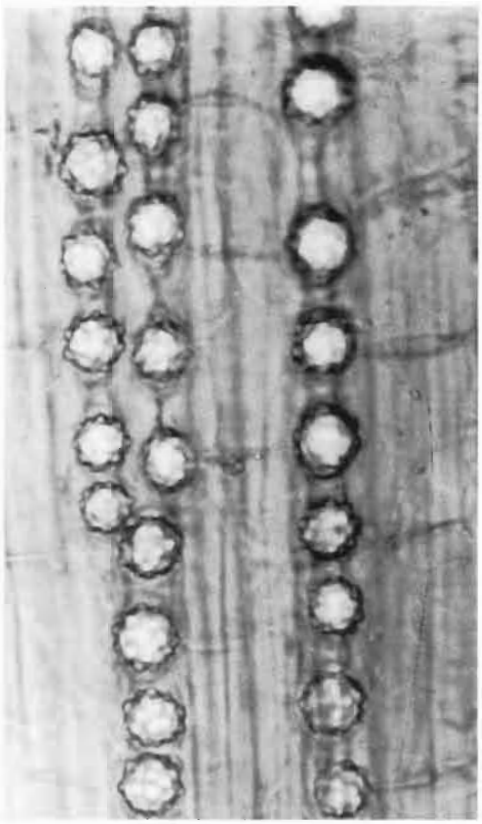
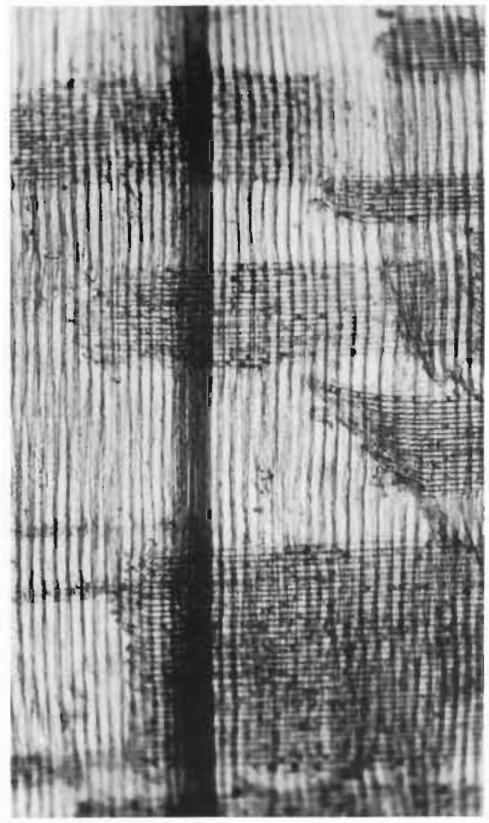


5

6



1. Thin section of Ficus sycomorus L.
2 – 4. Thin sections of Phoenix dactylifera L.
5. – 6. Thin sections of Cedrus libani Barr.

1 — 7. Skull of adult male A 10

1 — 7. Skull of adult male A 36/3 b

1

2

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4

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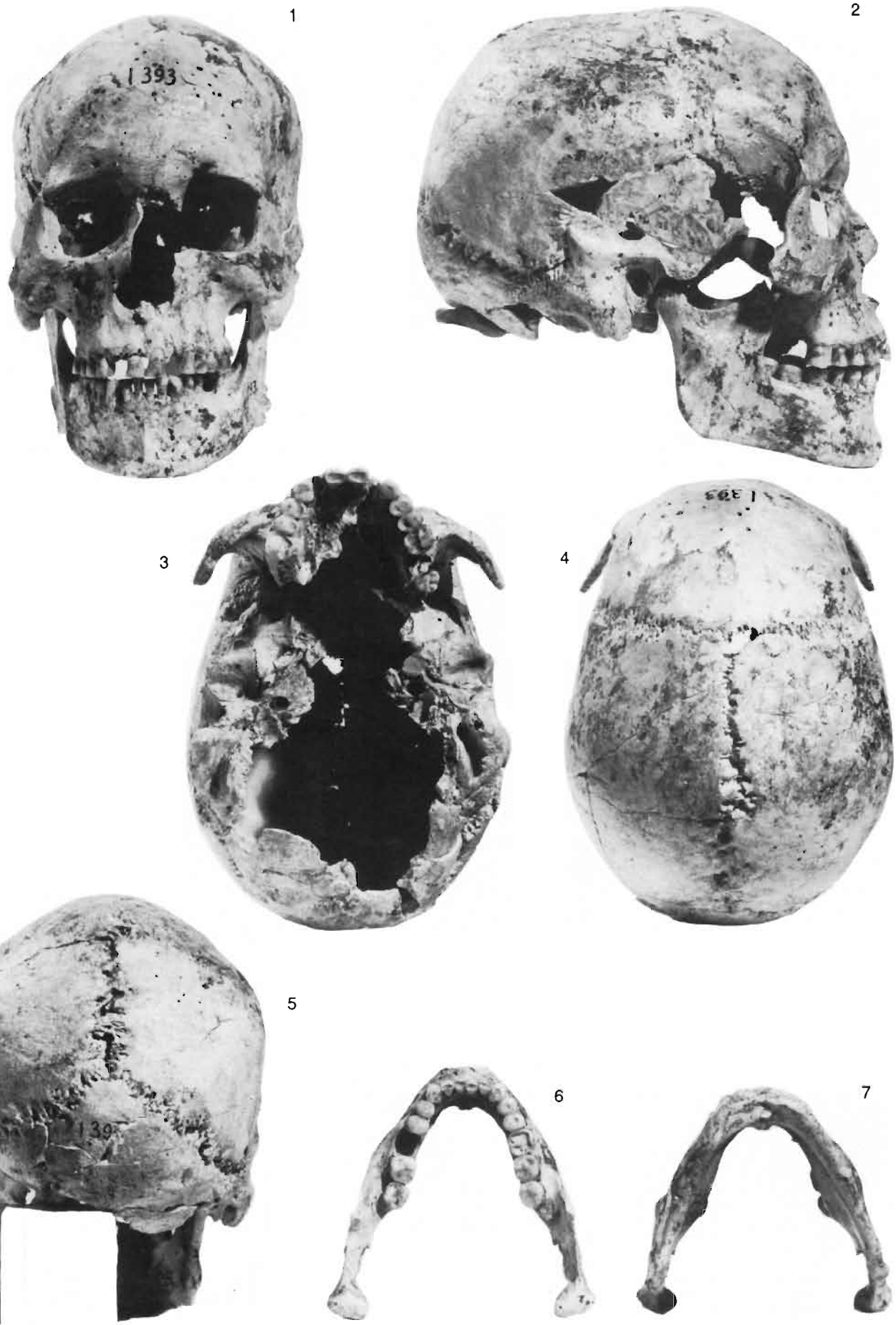
6

7

1 — 7. Skull of adult male A 44/2 d



1—7. Skull of adult male I 393

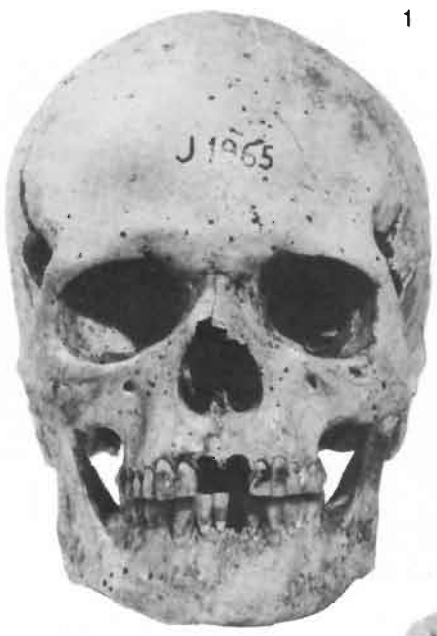
1 — 7. Skull of adult male I 407/1

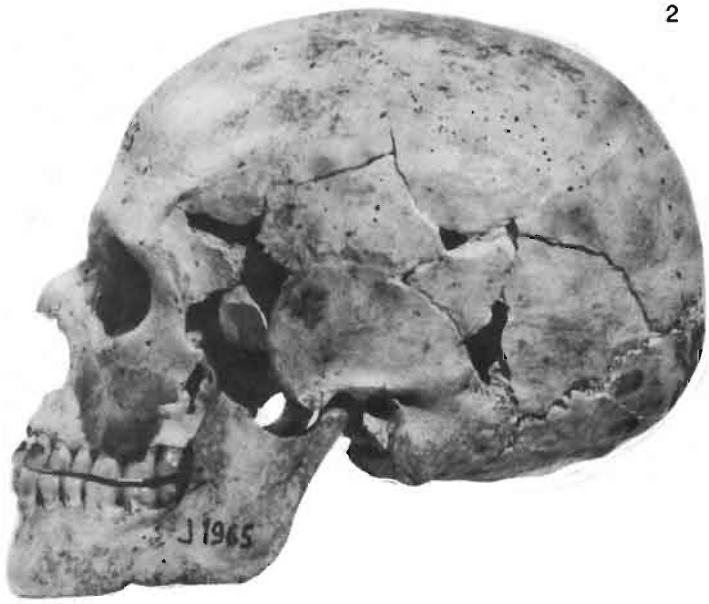
1–7. Skull of adult male I 411

1—7. Skull of adult male I 452

1—7. Skull of adult male J 542

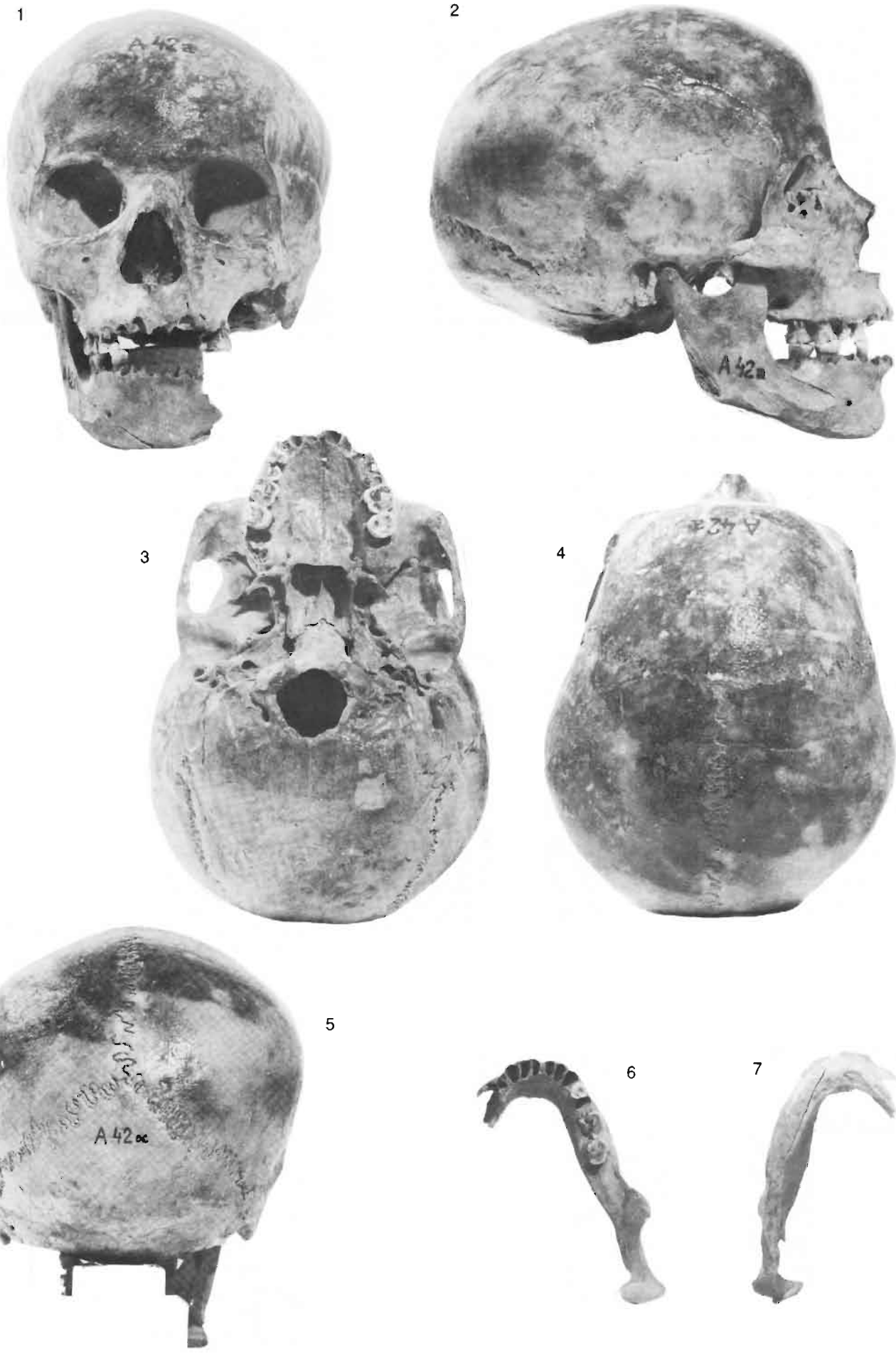
1 — 7. Skull of adult male J 1894





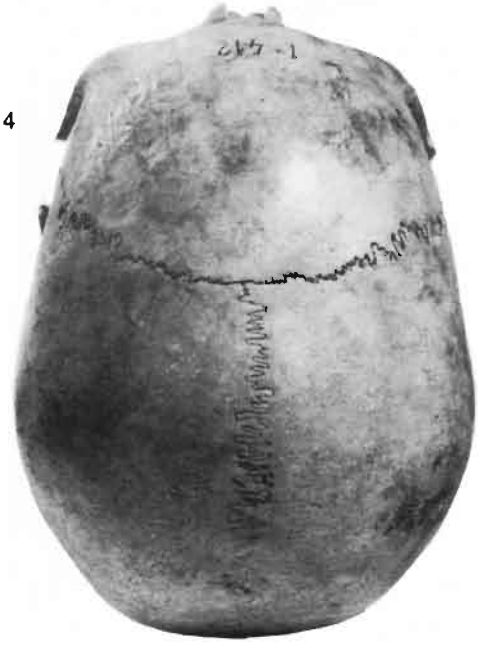
1—7. Skull of adult male J 1965

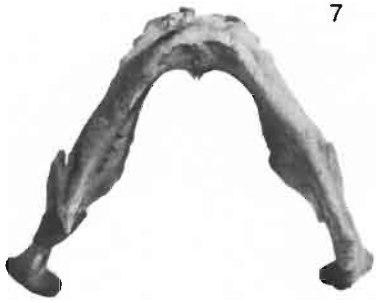
1 — 7. Skull of adult female A 3



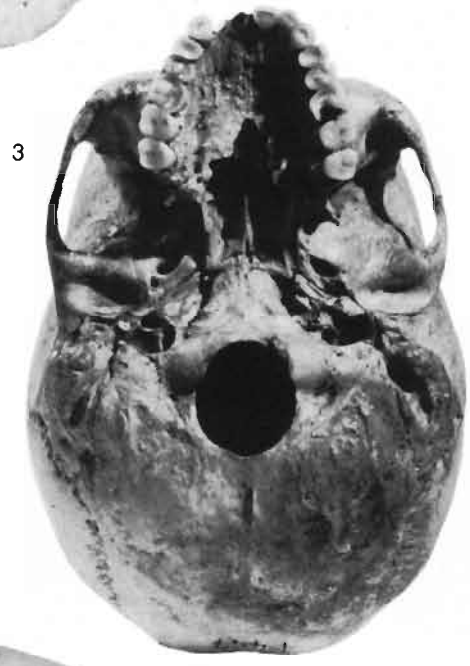
1—7. Skull of adult female A 42 a

1 — 7. Skull of adult female A 44/3

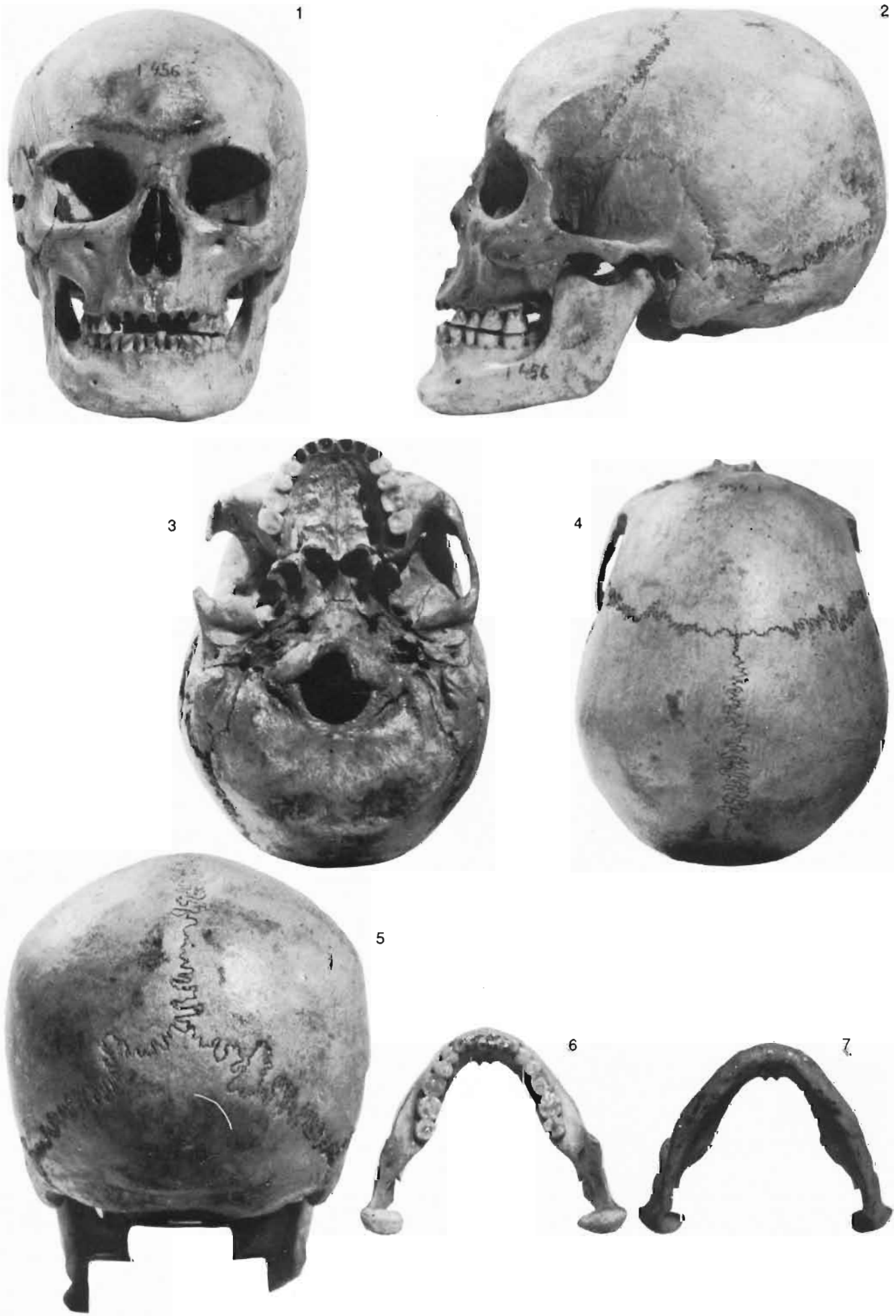




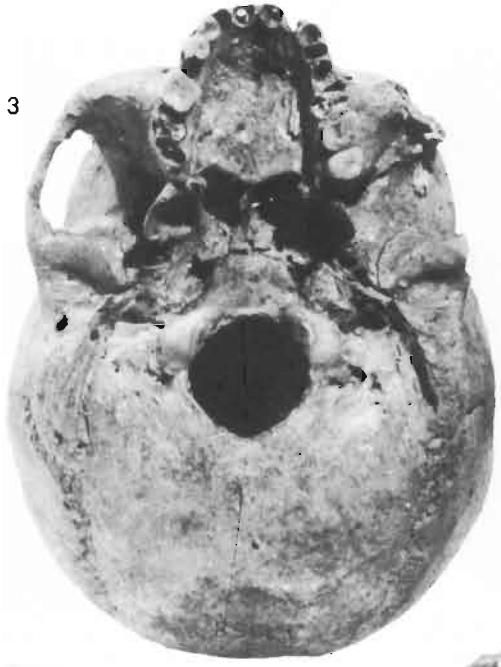
1 — 7. Skull of adult female I 412



1—7. Skull of adult female I 447



1 — 7. Skull of adult female I 456



1 — 7. Skull of adult female J 1958

1

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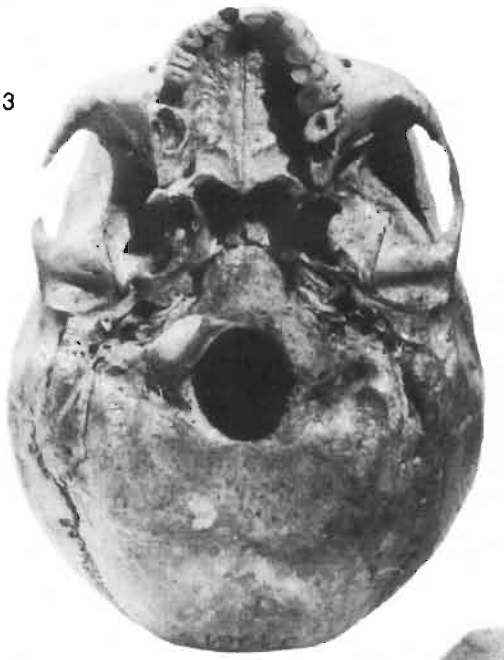

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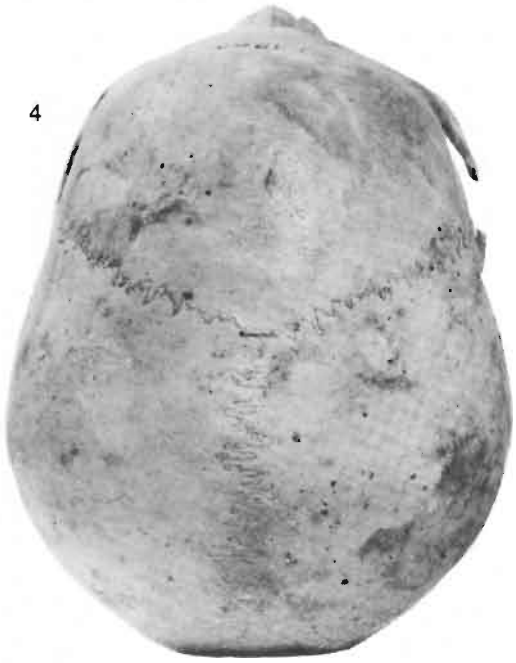

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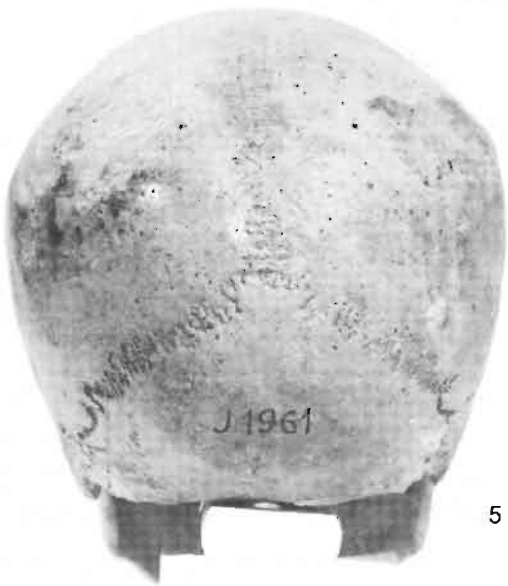

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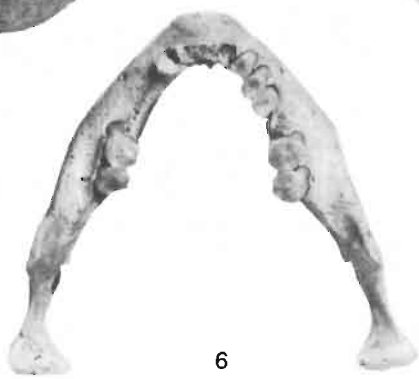

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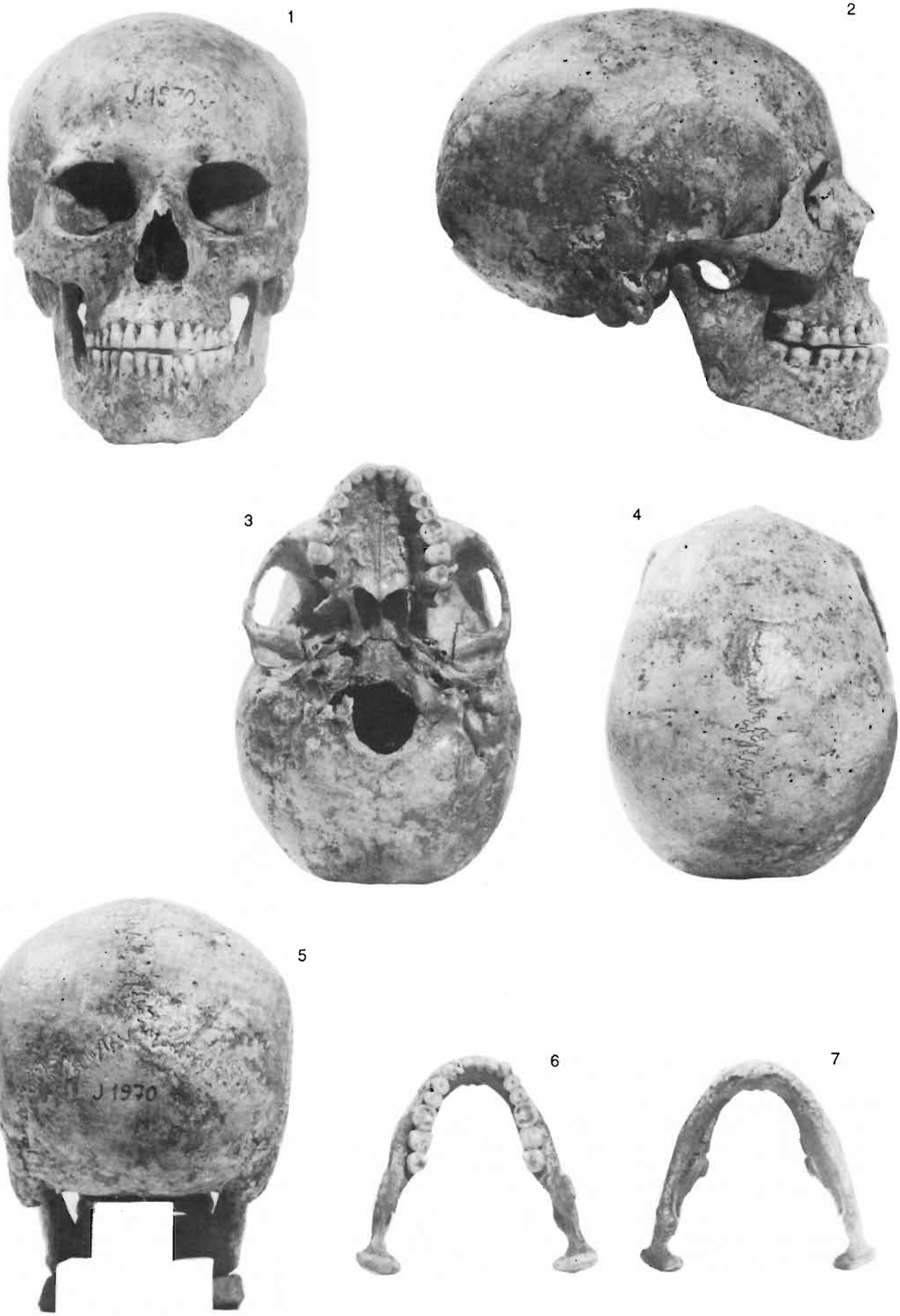
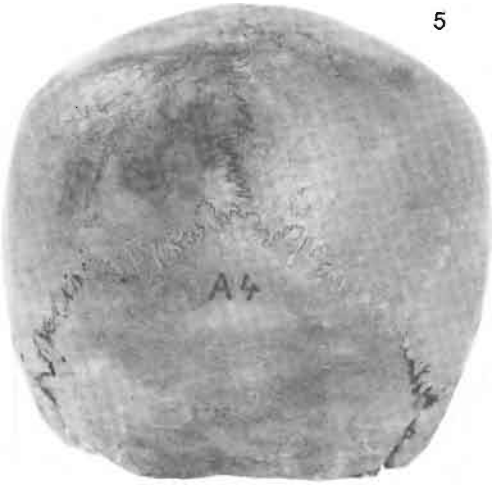
1—7. Skull of adult female J 1961

1—7. Skull of adult female J 1964



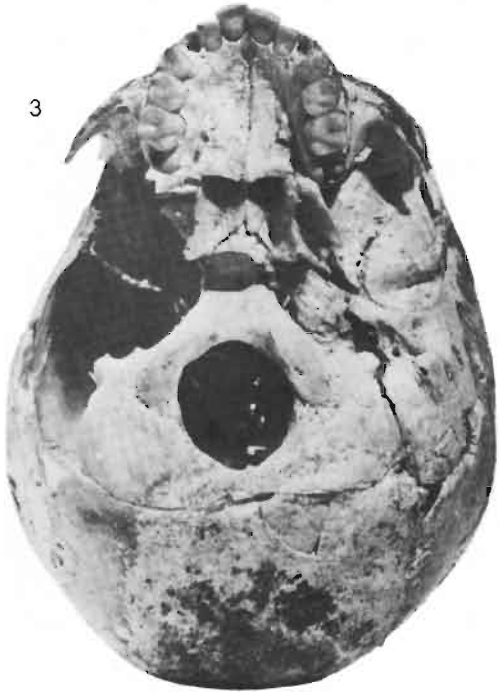
1 – 7. Skull of adult female J 1970



1—5. Skull of 6—7 year-old child A 4

1

2



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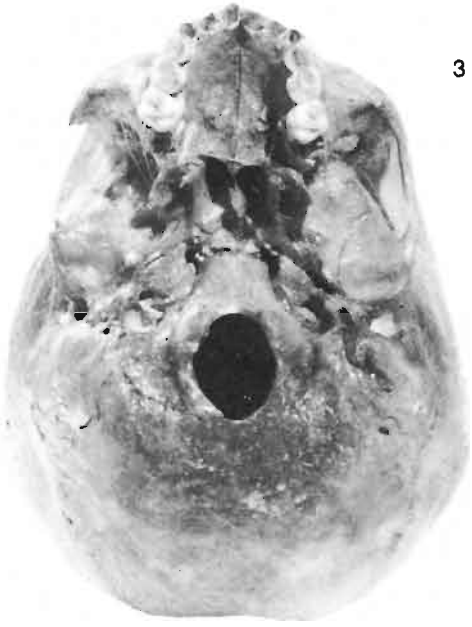
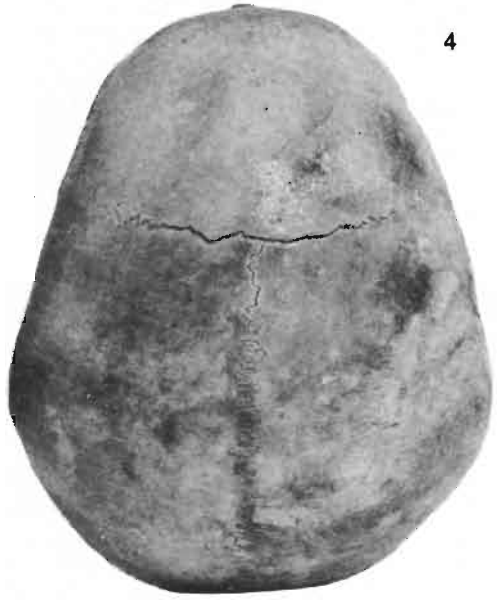
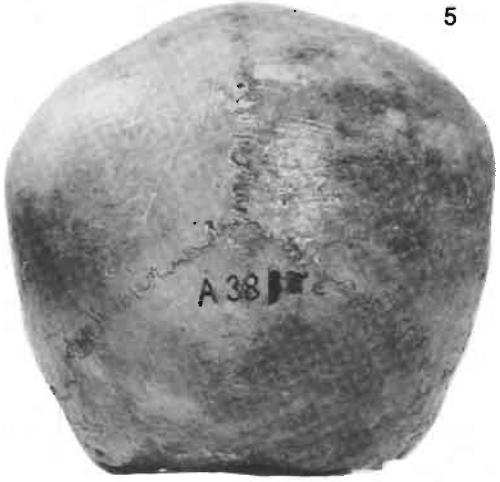
1—7. Skull of 7 year-old child J 1553

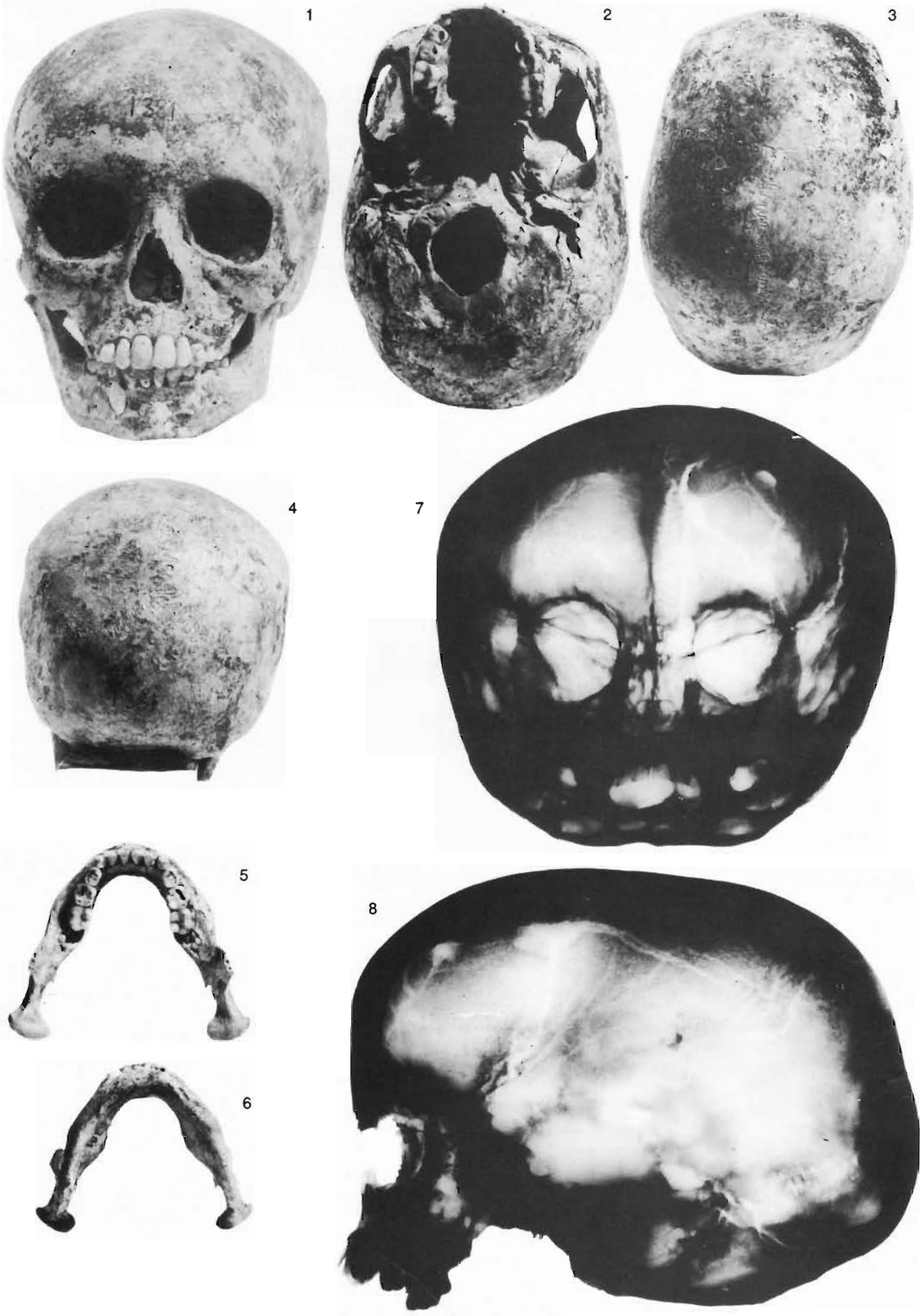






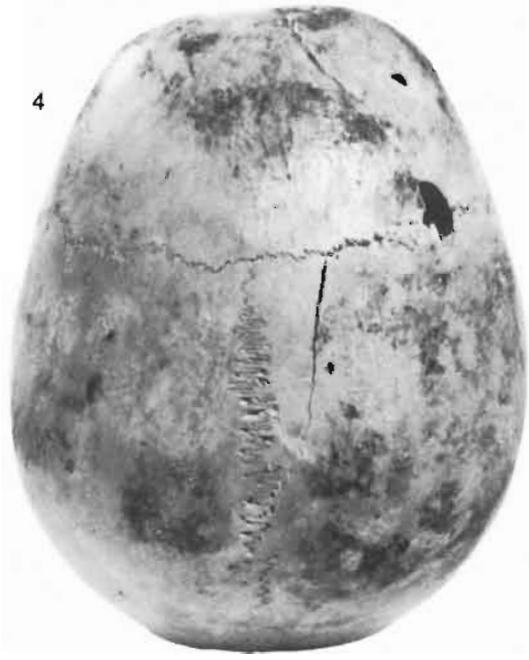
1—5. Skull of 8—9 year-old child A 38 c

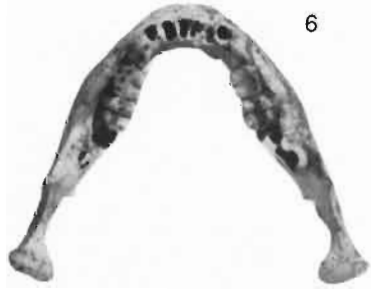
PLATE 61

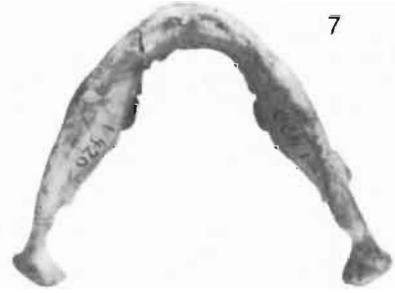


1—6. Skull of 9 year-old child I 381

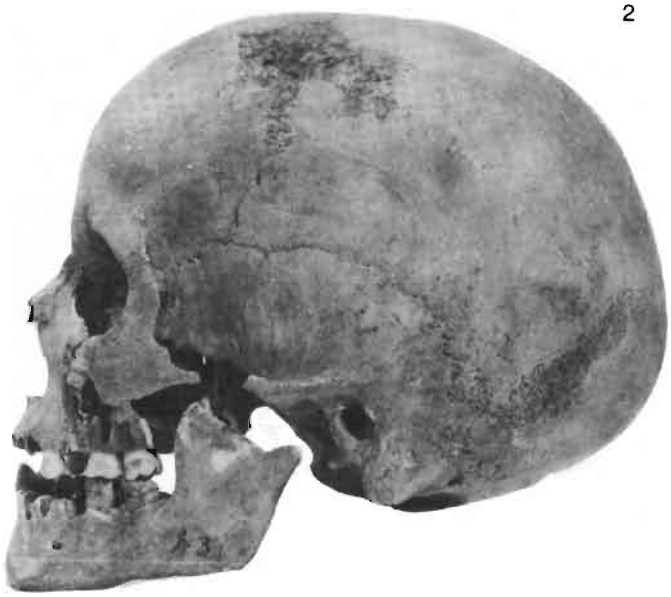
7—8. Antero-posterior and lateral X-rays of 9—10 year-old child I 420





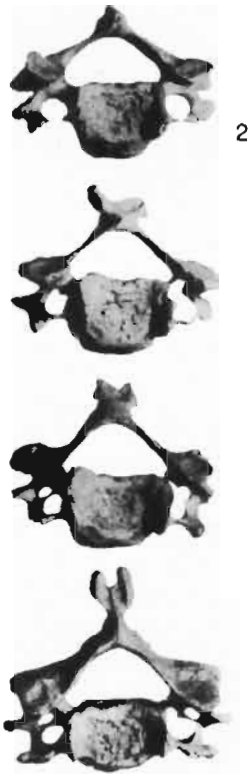


1 — 7. Skull of 9 — 10 year-old child I 420



1—7. Skull of 14—16 year-old male A 34

1



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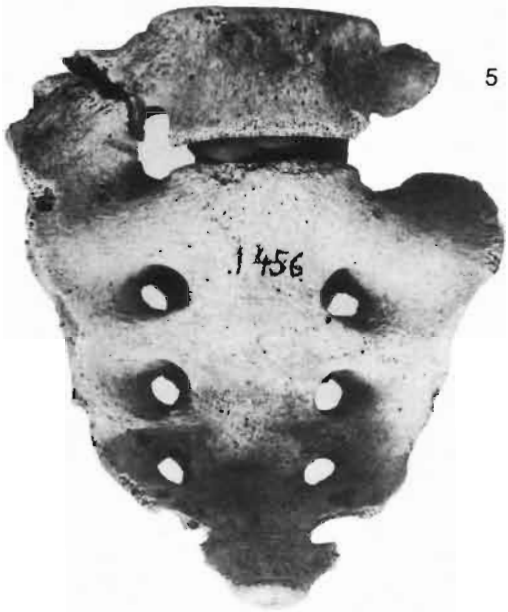

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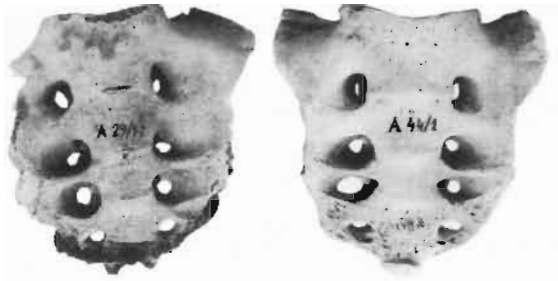

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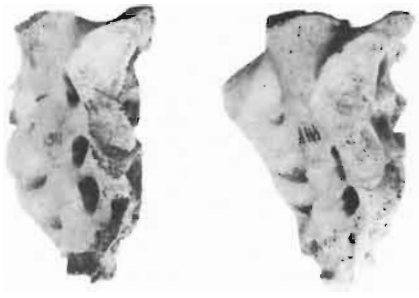
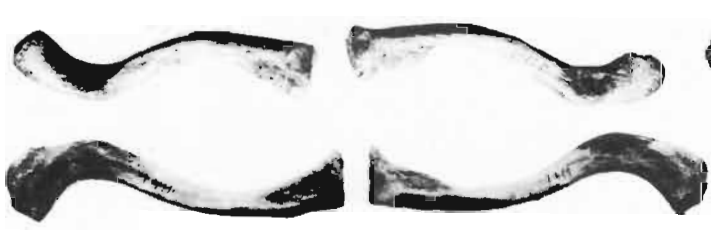
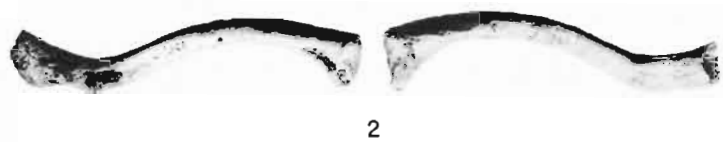


7

1. Rounded ridge on lateral aspect of mandible A 36/6 a
2. Double foramina transversalia on C_5 and C_6 of I 447
3. Six-element sacrum A 40 B
4. Six-element sacrum A 44/2 – 1
5. One-sided sacralization of L_5 of I 456
6. Flat sacra A 29/1 – 2 and A 44/1, frontal
7. Flat sacra A 29/1 – 2 and A 44/1, lateral



1



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1. Types of impressio ligamenti costoclavicularis in J 1970 and I 411
2. Side difference in the type of impressio ligamenti costoclavicularis in J 1965
3. Cleft in the place of attachement of musculus pectoralis maior in humerus A 40/1 – P 1
4 – 6. Examples of strong development of the tuberositas deltoidea of humeri A 29/1 – 2 – L 1, I 395, I 466 and J 1761
7. Side difference in the development of the cleft in the place of attachement of musculus pectoralis maior in humerus I 444

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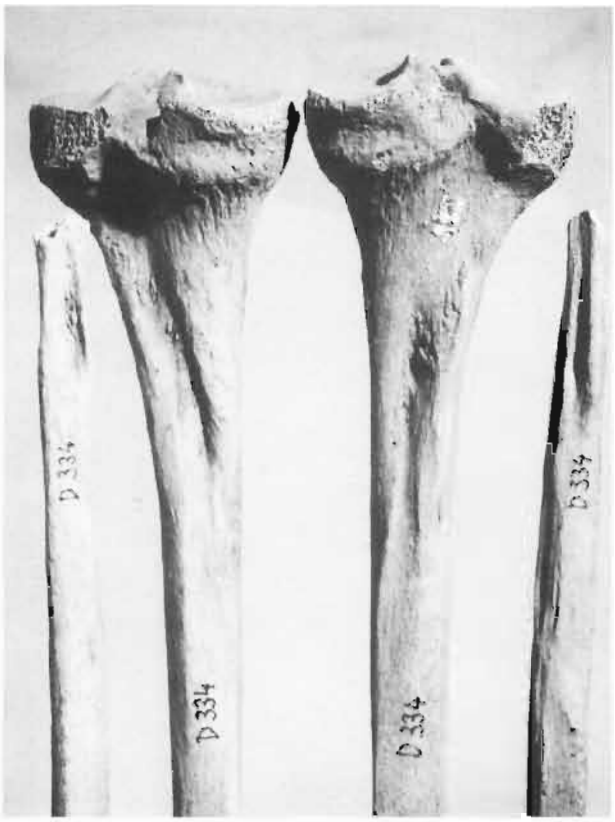

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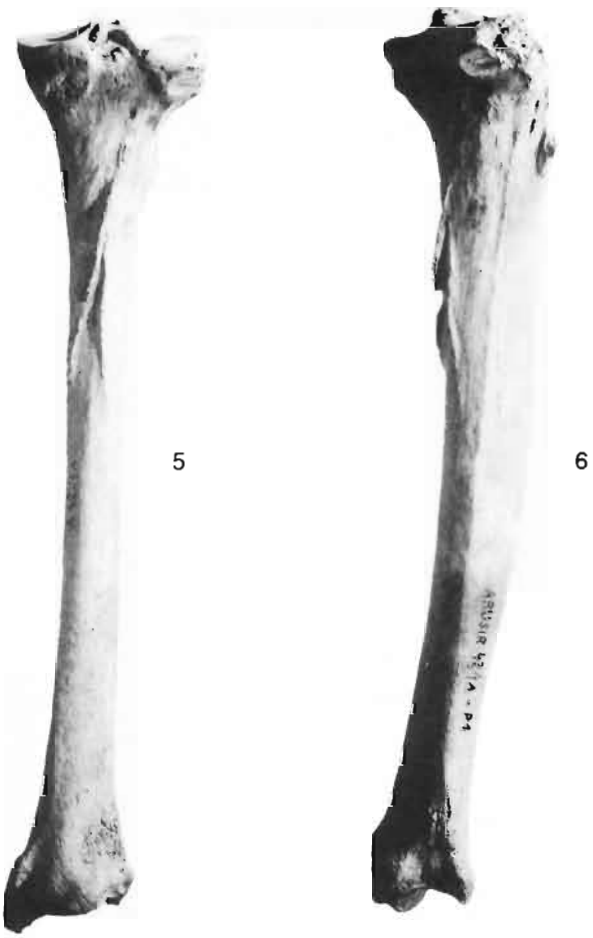

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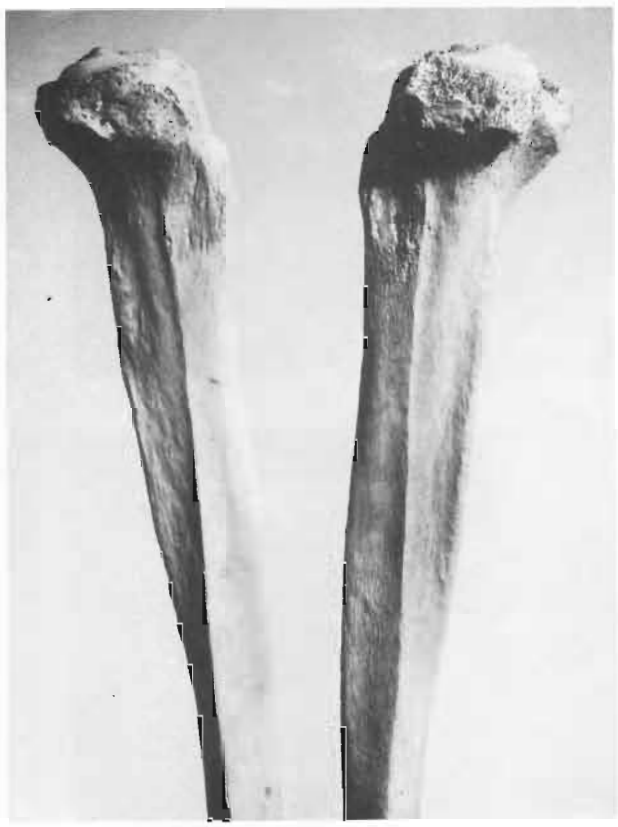
6

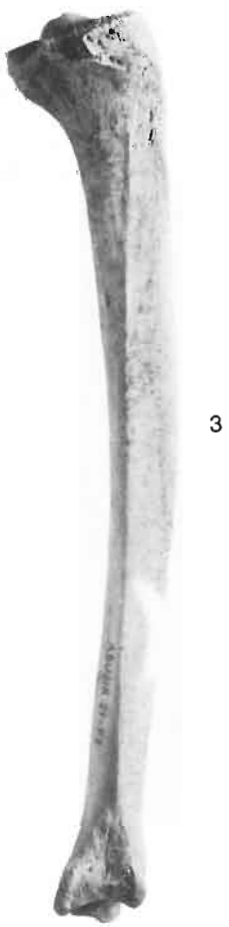
1. Side difference in the development of the crista musculi supinatoris in the ulna of J 1971

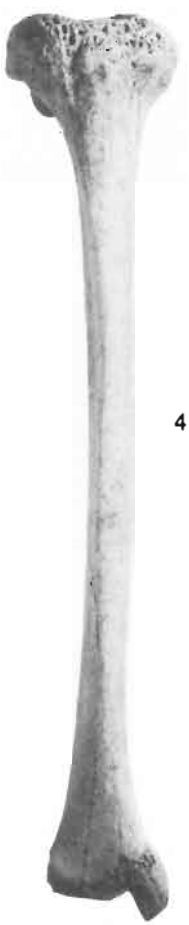
2. Deeply grooved lineae musculi solei on the tibiae and upper parts of the shafts of fibulae of D 334

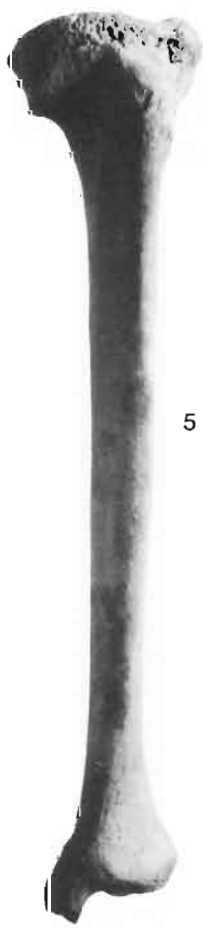
3—4. Ridged linea musculi solei on left tibia A 40/B—L 1, lateral and back views

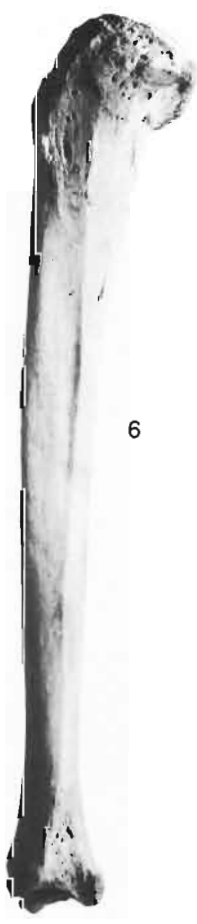
5—6. Ridged linea musculi solei on right tibia A 42/A—P 1, back and lateral views











1 – 2. Sabre-shaped tibiae of D 130 a
3 – 4. Thin bent tibia A 21 – P 2
5 – 6. Sabre-shaped tibia A 36/5 – 2

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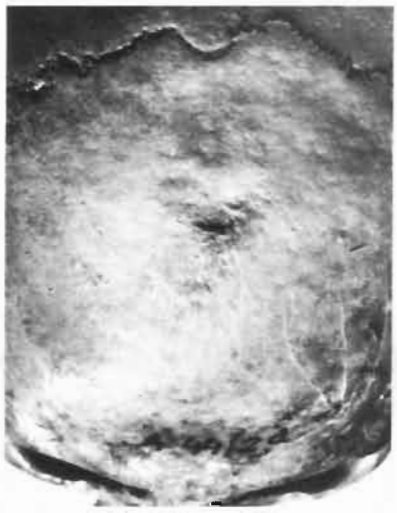

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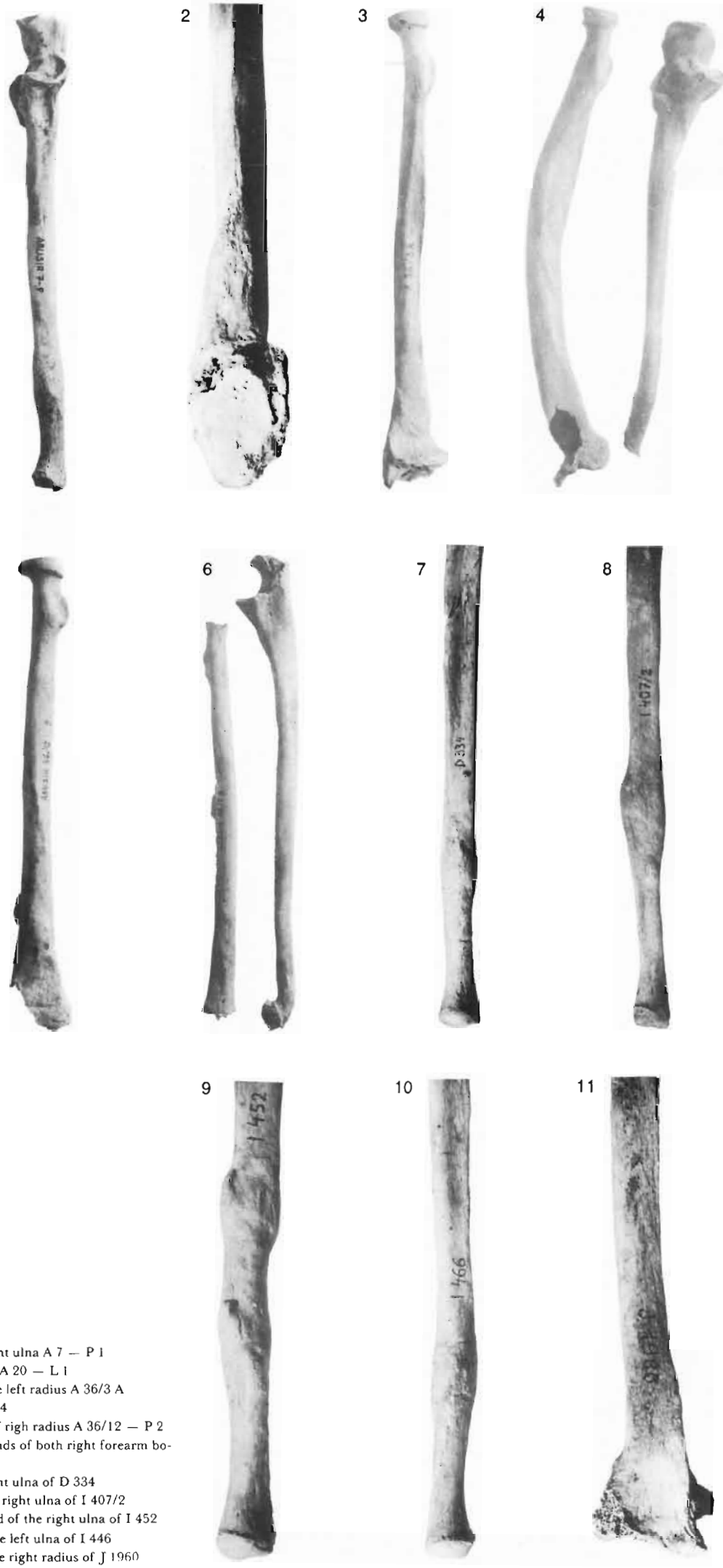
1. Healed depressed fracture on the frontal scale of A 6
2. Healed depressed fracture by cut on the parietal bone of A 10
3. Healed fracture of the left edge of the apertura piriformis of A 12
4. Healed depressed fracture on the parietal bone of A 36/3 b
5. Healed depressed fracture by stab on the frontal scale of A 44/2 d
6. Healed depressed fracture by blunt blow on the parietal bone of I 324
7. Healed depressed fracture by blunt blow on the frontal scale of I 383



1. Healed parry fracture of the distal third of right ulna A 7 — P 1
2. Healed fracture of the distal end of the radius A 20 — L 1
3. Healed Smith's fracture of the distal end of the left radius A 36/3 A
4. Axis change of both right forearm bones A 36/4
5. Healed fracture loco typico of the distal end of righ radius A 36/12 — P 2
6. State after a healed amputation of the distal ends of both right forearm bones A 36/7 B
7. Healed parry fracture of the distal third of right ulna of D 334
8. Healed parry fracture of the distal third of the right ulna of I 407/2
9. Healed double parry fracture of the distal third of the right ulna of I 452
10. Healed parry fracture of the distal third of the left ulna of I 446
11. Healed Colles' fracture of the distal end of the right radius of J 1960

1. X-ray of the fracture of the right ulna A 7 — P 1
2. X-ray of the fracture of the left radius A 20 — L 1
3. X-ray of the fracture of the radius A 36/3 A
4. X-ray of axis change of both forearm bones A 36/4
5. X-ray of the fracture of the right radius A 36/12 — P 2
6. X-ray of amputation of the distal end of the right ulna A 36/7 B
7. X-ray of the fracture of the right ulna of D 334
8. X-ray of the fracture of the right ulna of I 407/2
9. X-ray of the double fracture of the right ulna of I 452
10. X-ray of the fracture of of the left ulna of I 466
11. X-ray of the fracture of the right radius of J 1960

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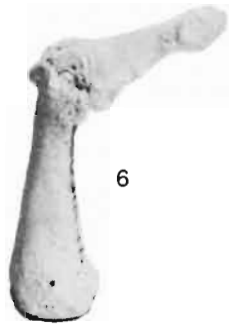
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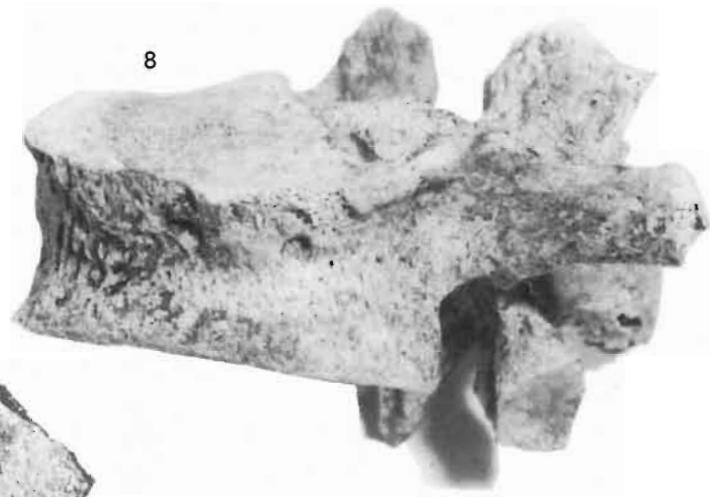
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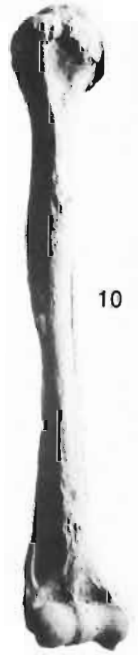
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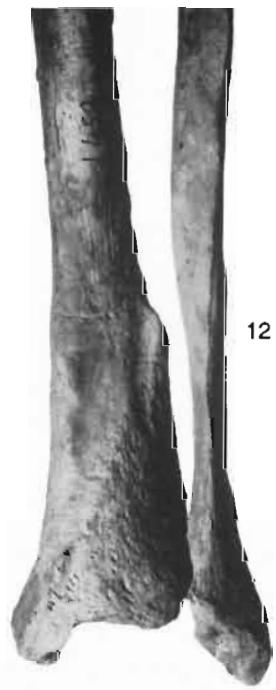
12

1. Healed fracture of the lateral third of the left clavicle A 23—L 3 with pseudoarthrosis complicated by inflammation
2. Healed fracture of the sternal end of the right clavicle of I 448
3. Healed fracture of the middle third of the left clavicle of J 1973 with the normal right clavicle for comparison
4. Healed spiral fracture of the right metacarpal IV A 44/2
5. Healed spiral fracture of the left metacarpal IV of D 135
6. Posttraumatic ankylosis of the proximal interphalangeal joint of the left fifth finger A 46 — 1
7. Traumatic compression of the body of a lumbar vertebra A 46—4 from above
8. Traumatic compression of the body of L_1 of J 1483
9. Healed fracture on the border between the right ischium and pubis of I 444
10. Posttraumatic deformation of the diaphysis of the right humerus A 43/2 — P 1 with of osteomyelitis and shoulder joint arthritis
11. Healed fracture of the neck of the right fibula of I 452 with fistulae from osteomyelitic complication
12. Healed spiral fracture of the distal end of the right tibia of the same individual I 452

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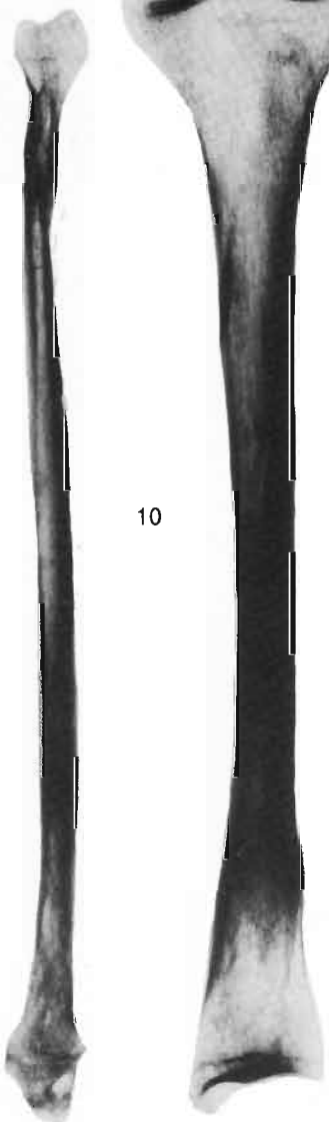
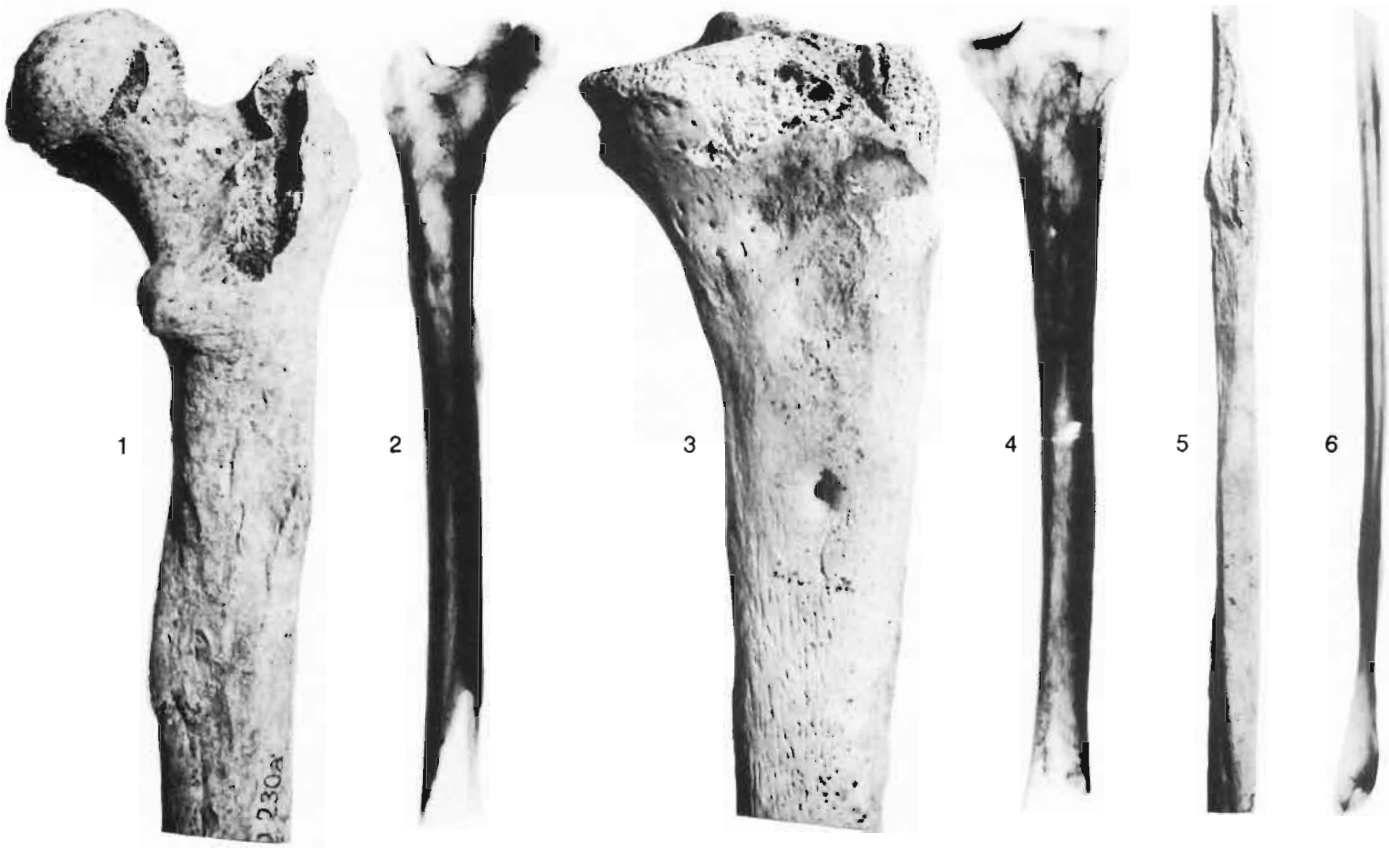
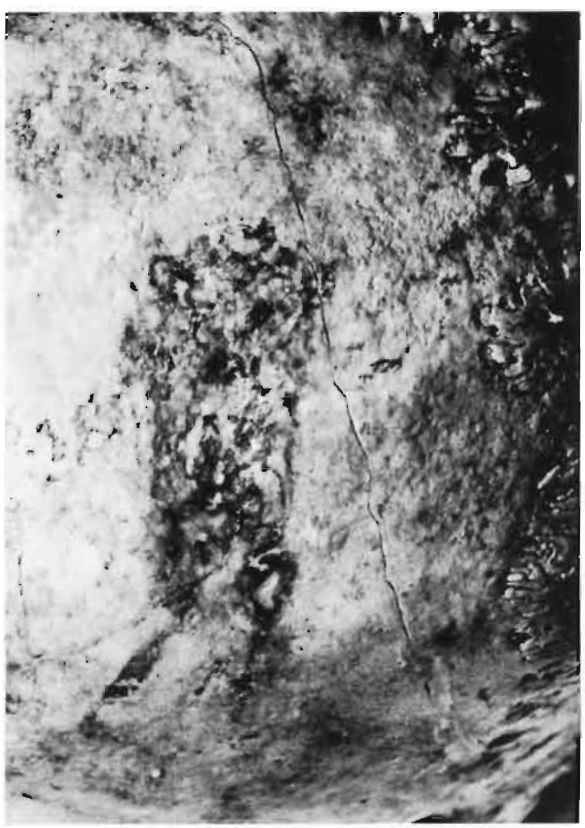
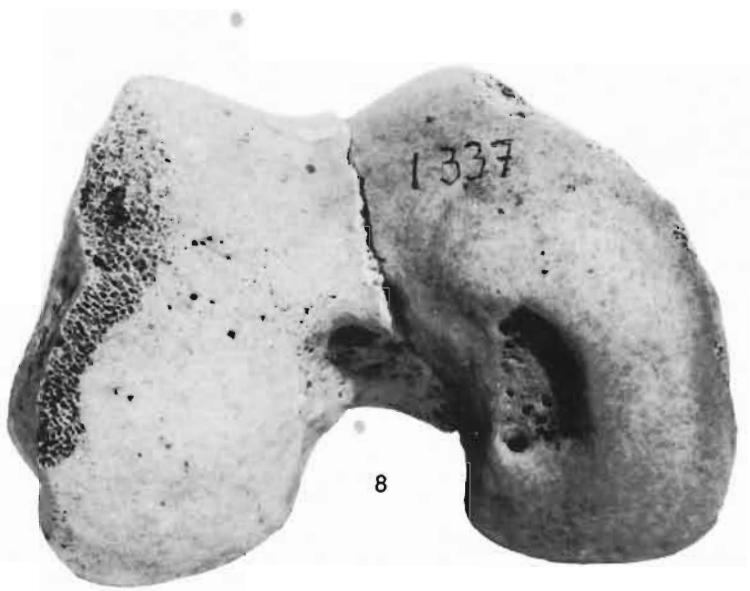

10

1. X-ray of the fracture of left clavicle A 23 – L 3
2. X-ray of the fracture of the right clavicle of I 448
3. X-ray of the fracture left and normal right clavicles of J 1973
4. X-ray of the fracture of right metacarpal IV A 44/2
5. X-ray of the fracture of the left metacarpal IV of D 135
6. X-ray of the traumatic compression of a lumbar vertebra A 46 – 4
7. X-ray of the traumatic compression of L_1 of J 1483
8. X-ray of the fracture on the border of the right ischium and pubis of I 444
9. X-ray of the posttraumaticaly deformed right humerus A 43/2 – P 1 with traces of osteomyelitis and arthritis
10. X-ray of the fractures of the neck of the right fibula and of the distal end of the right tibia of I 452







1. Chronic osteomyelitis in the proximal third of the diaphysis of the right femur D 230 a
2. X-ray of the chronic osteomyelitis of the right femur D 230 a
3. Chronic osteomyelitis in the proximal third of the diaphysis of the left tibia of I 456
4. X-ray of the chronic osteomyelitis of the left tibia of I 456
5. Irregular thickening in the proximal third of left fibula caused by periostosis of I 466
6. X-ray of periostoses in the proximal and distal thirds of left fibula of I 466
7. Ostitis on the left parietal bone of I 460
8. Osteochondritis dissecans of the right femur I 337

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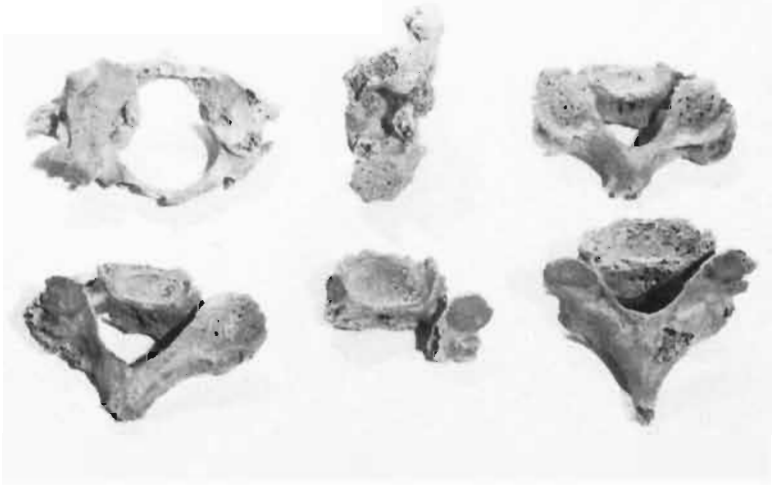

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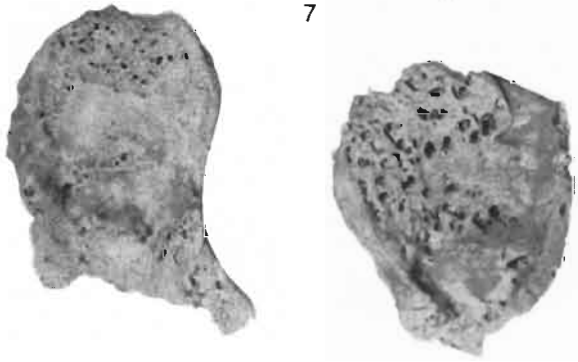

1. Spinal osteophytosis on $C_2 - C_6$ of I 396
2. Spinal osteophytosis on $C_3 - Th_1$ of I 392
3. Spinal osteophytosis on $Th_3 - Th_8$ of I 414
4. Spinal osteophytosis on $L_1 - L_6$ of I 386
5. Degenerative spondylarthritis of cervical vertebrae (except C_6 and C_7) and probably secondary blocks between atlas and cranial condyle and $C_2 - C_3$ of 1960 (see also Pl. 81:5 – 8)
6. Osteochondrosis on $C_3 - C_6$ of I 395
7. Degenerative spondylarthritis of $L_{4/5}$ of D 135

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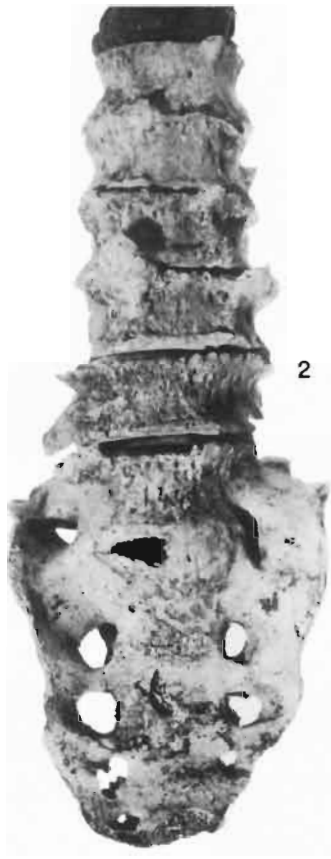

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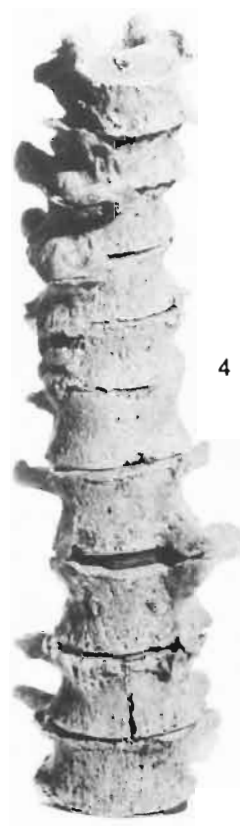

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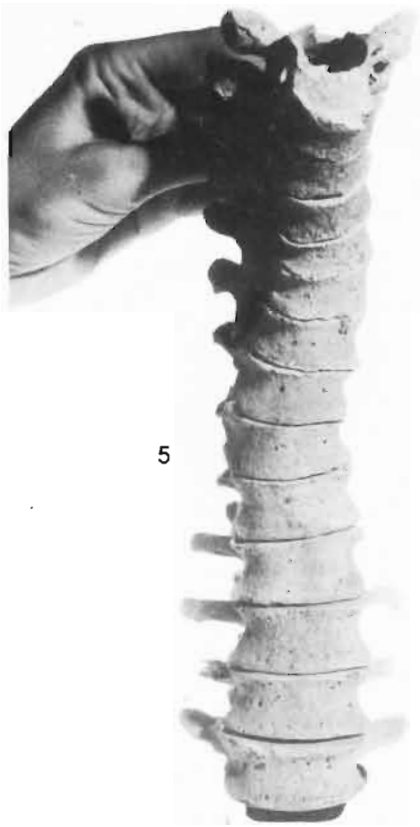

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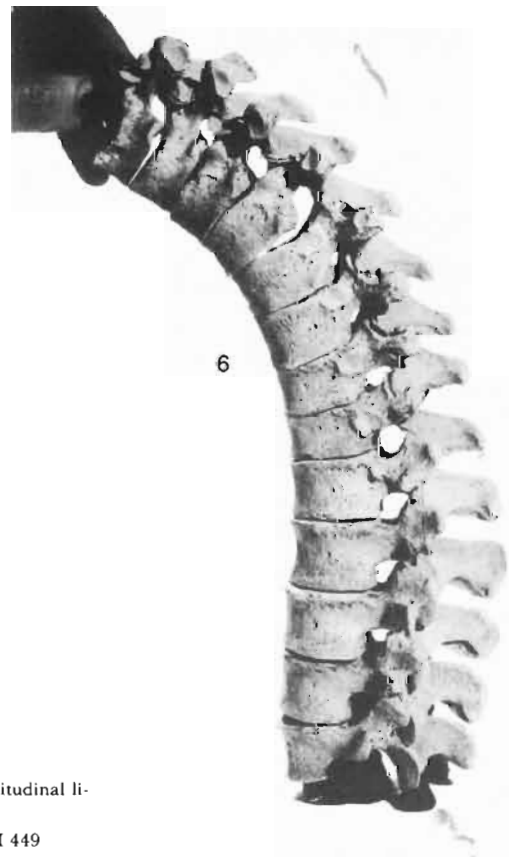

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1. Spinal osteophytosis with ossification of the right anterior longitudinal ligament in the thoracic spine of I 449

2. Spinal osteophytosis in the lumbar spine of the same individual I 449

3—4. Bridging spinal osteophytosis combined with a slight S-shaped kyphoscoliosis in I 452

5—6. Expressed S-shaped kyphoscoliosis of the spine with only incipient osteophytosis of Th_{7-11} in D 130 a

7. S-shaped scoliosis of the thoracic spine with spine with bridging osteophytosis between $Th_{8/9}$ and $Th_{9/10}$ in D 230 a

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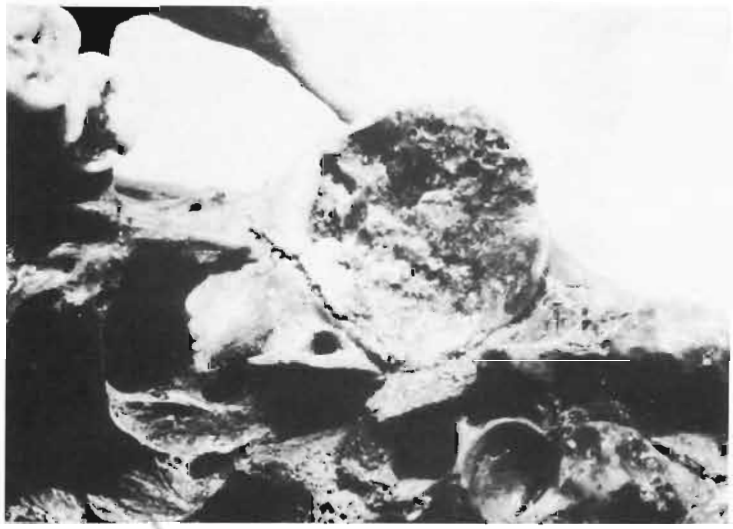

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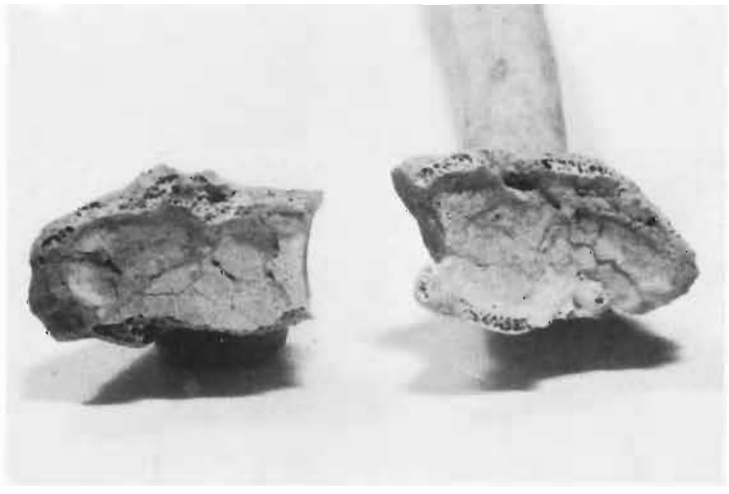

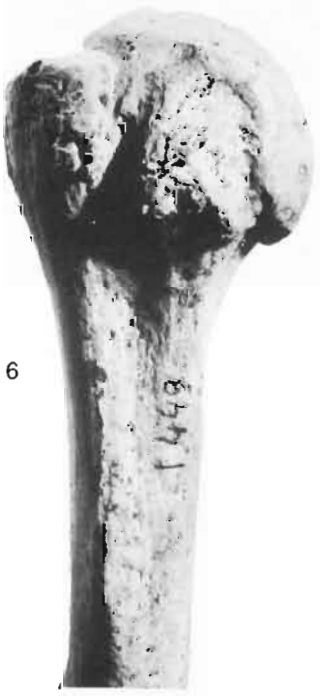

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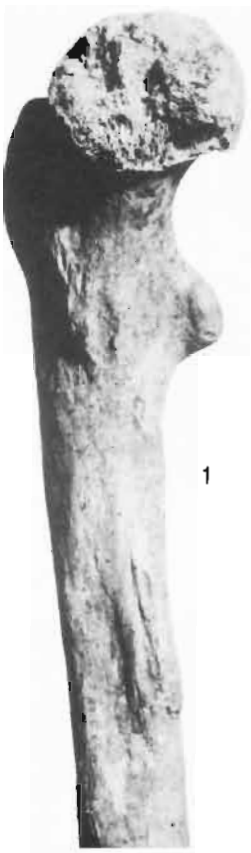
1. Degerative arthritis of the right mandibular comdyle of A 36/9 a
2. Degenerative arthritis of the left mandibular condyle of D 130 a
3. Degenerative arthritis of the left mandibular condyle of J 1744
4. Degenerative arthritis of the left facies glenoidalis of the temporal bone in A 46 d
5. Degenerative arthritis of the distal articular surfaces of both radii of J 1960
6. Degenerative arthritis of the right humeral head of I 449



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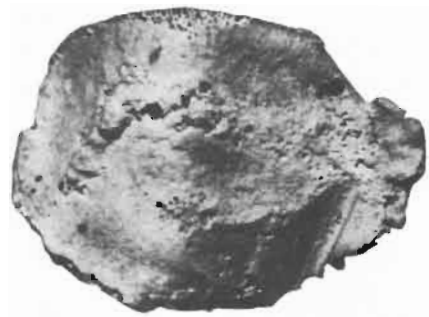

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1. Severe degenerative arthritis of the right femoral head of I 454
2. Severe degenerative arthritis of both patellae with eburnisation and abrasive grooves in J 1899
3. Degenerative arthritis of both patellae with productive changes in J 1960
4. Degenerative arthritis of the right talocalcaneal joint of I 449
5. Degenerative arthritis of the left calcaneus A 43/4 – L 1
6. Degenerative arthritis of the left calcaneus A 44/1 – L 1
7. Degenerative arthritis of the right calcaneus A 46 – P 1

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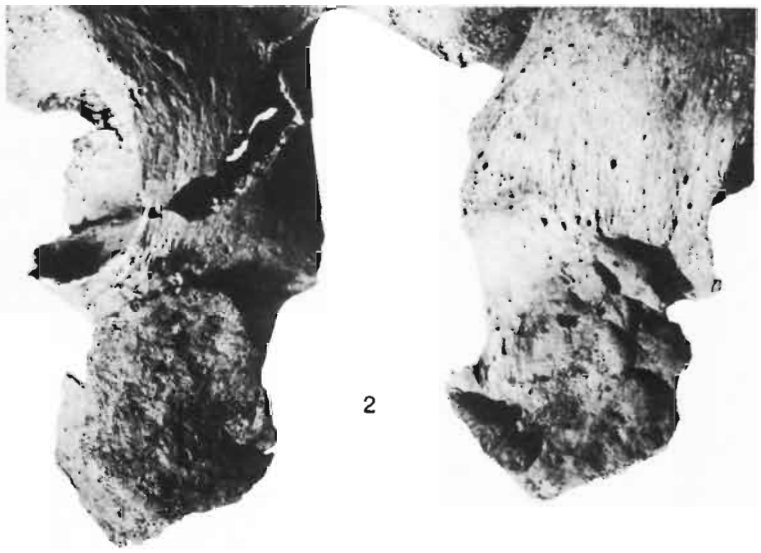

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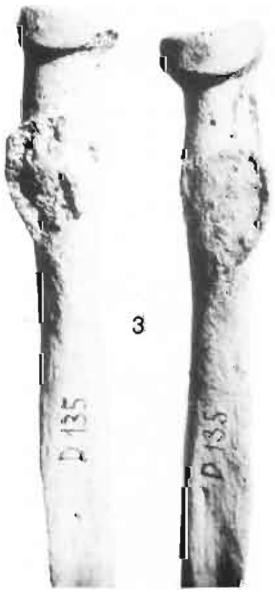

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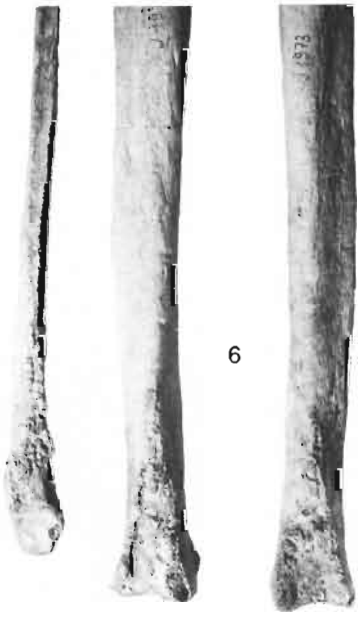

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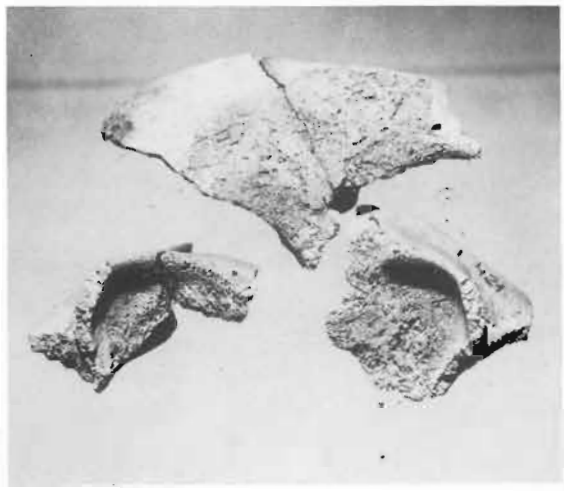
1. Enthesopathic ossification of the supraspinal ligament between $Th_{4/6}$ A 6
2. Osteophytes of both tubera ischiadica of I 449
3. Osteophytes of both tuberositates radii of D 135
4. Osteophytes of both fibulae A 43/2 — L I and P I
5. Osteophytes in the proximal quater of the left fibula of I 393
6. Osteophytosis in the distal sections sections of both tibiae and left fibula of J 1973
7. Osteoma on the occipital scale of A 36/4 a



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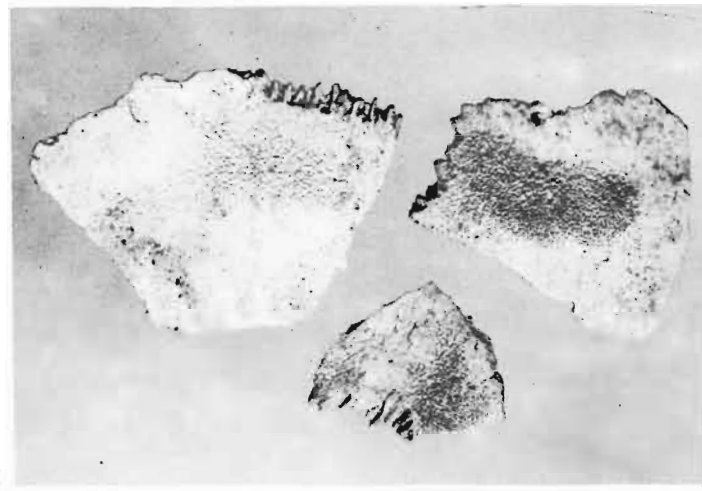

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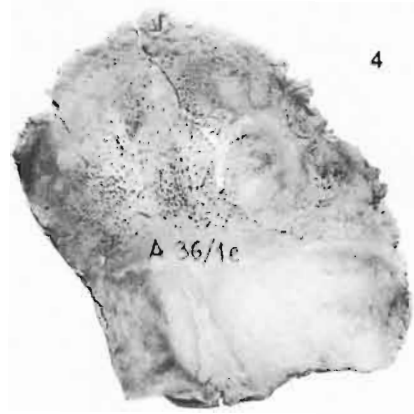

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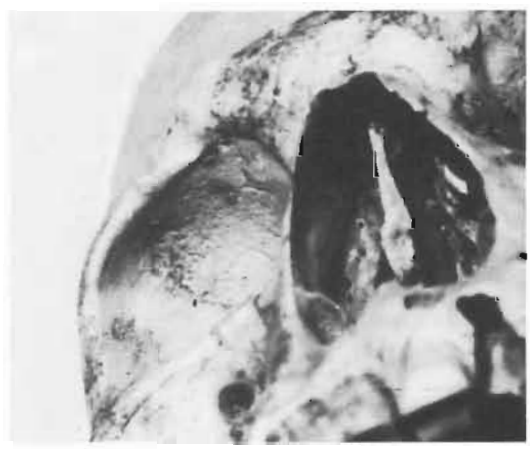

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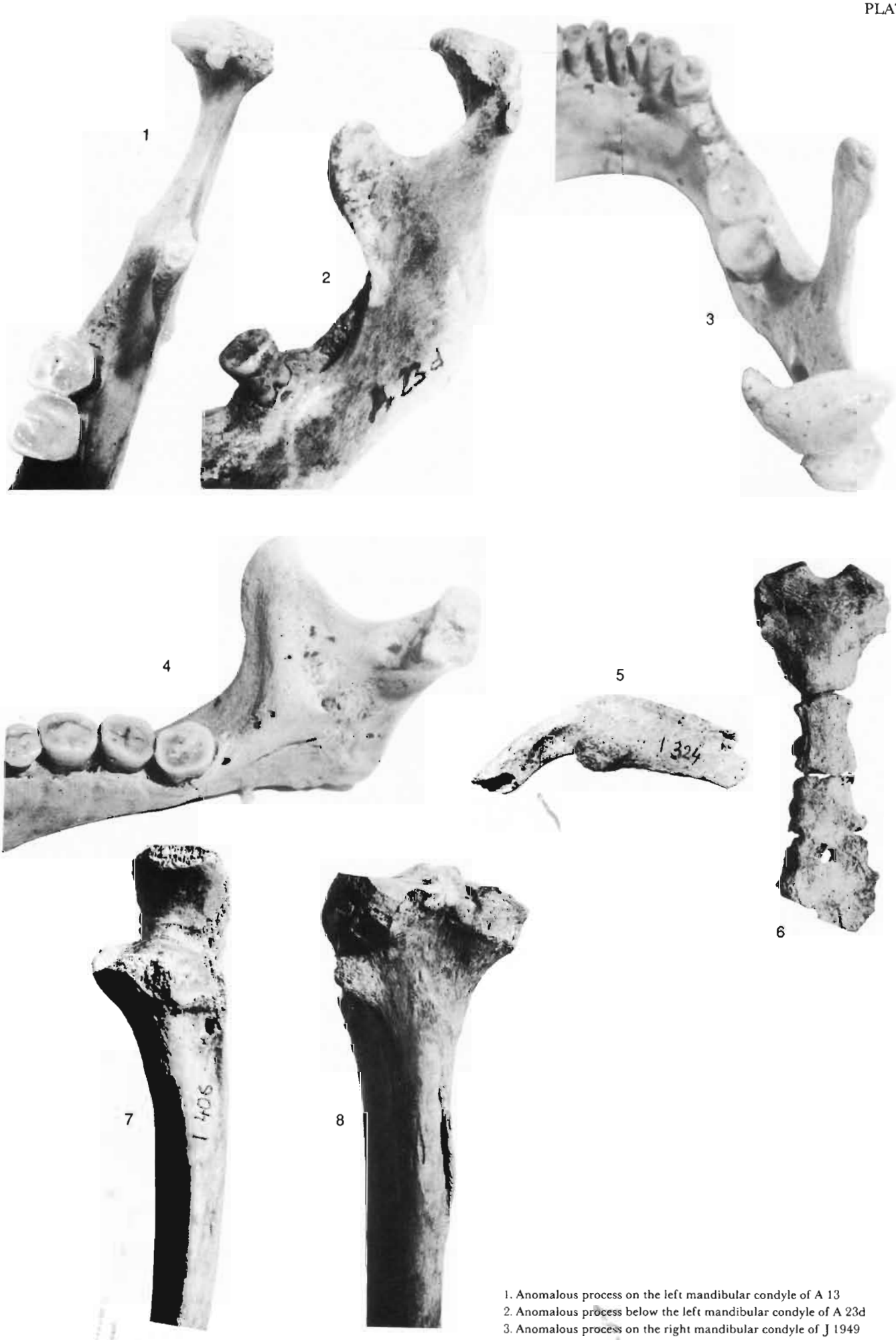
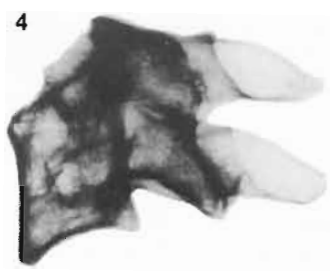
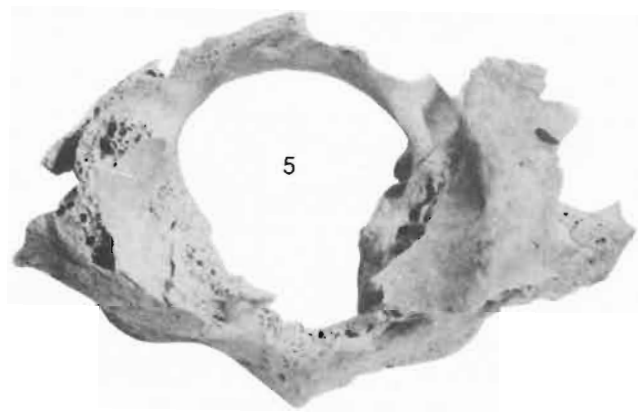
1. Extended trabecular cribra orbitalia and porotic hyperostosis on the frontal a scale of 1/2 to 1 year old infant I 421
2. Porotic hyperostosis on both ossa parietalia in the same individual I 421
3. Partially heavy and partially slight cribra orbitalia in a 3 year old child I 446
4. Cribra cranii on the inner surface of the occipital scale of a 2—3 year old child A 36/1 e
5. Trabecular cribra orbitalia in a 13—14 year old child I 403
6. Porotic hyperostosis on the right parietal bone of the same individual I 403
7. Remnants of cribra orbitalia in adult A 46 d
8. Almost healed cribra orbitalia in adult A 6

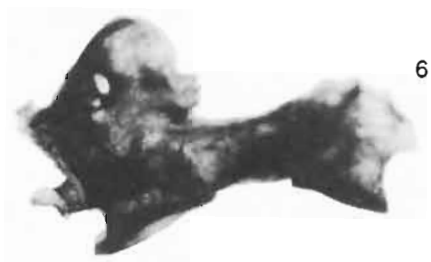


1. Anomalous process on the left mandibular condyle of A 13
2. Anomalous process below the left mandibular condyle of A 23d
3. Anomalous process on the right mandibular condyle of J 1949
4. Anomalously divided right mandibular condyle of I 448
5. Anomalous tubercle on the first right rib of I 324
6. Incompletely fused corpus sterni of I 444 with a round dehiscence
7. Perforated crista supinatoria of the left ulna of I 406
8. Anomalous tuber below facies articularis fibularis of the left tibia of I 452. Note the ridged linea musculi solei.

PLATE 81







1. Congenital block of C_2 and C_3 A 23
2. X-ray of the congenital block of C_2 and C_3 A 23
3. Congenital block of C_4 and C_5 A 42/1
4. X-ray of the congenital block of C_4 and C_5 A 42/1
5. Probably secondary block of C_1 and occipital condyle in an old female J 1960 with severe spondylarthritis
6. X-ray of the possibly secondary block of C_1 and occipital condyle of J 1960
7. Torso of a probably secondary block of C_2 and C_3 in the same individual J 1960
8. X-ray of the probably secondary block of C_2 and C_3 of J 1960
9. Anomalous atlas of I 456

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1. Spondylolysis on L_5 A 6
2. Spondylolysis on both L_4 and I_{-4} of I 444
3. Spondylolysis on L_5 of D 135
4. Spondylolysis on L_4 of I 411

1. Canalis sacralis apertus of D 123
2. Canalis sacralis apertus of I 444
3—4. Spina bifida of S_4 and S_5 linked with scoliosis of the sacrum in I 448

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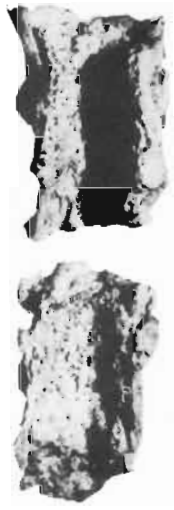

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1—2. Deformation of the right femoral head suggesting the Calvé-Legg-Perthes-Maydl disease in I 457

3. X-ray of the deformed right femoral head of I 457

4. Ankylosis of the right sacroiliacal joint of J 1973 (the sacrum has been broken off)

5. Fragments of ossified trachea of I 449

6. Symmetrical parietal atrophy in 50—60 year old female J 1960

7. Ossification of the cartilage of the first rib fusing with the manubrium sterni A 36/3 D

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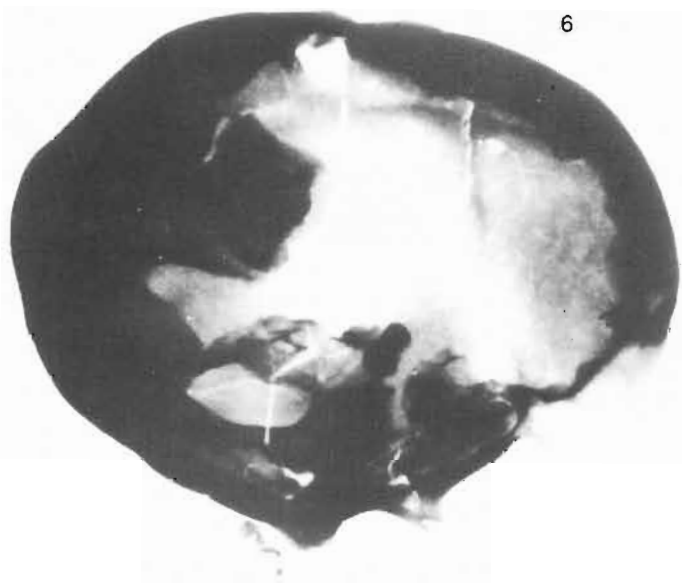

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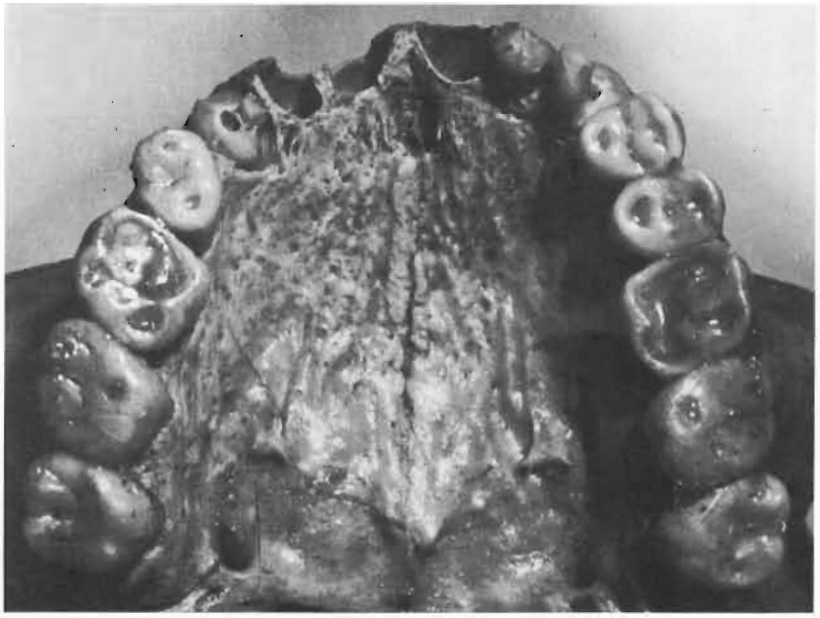
1. Postmortal perforations in the left parietal bone of I 324
2. X-ray of the perforations of I 324
3. Similar perforation of the left processus coronoideus of the mandible of the same individual I 324
4. X-ray of perforating granulations of Pacchioni of I 44
5. Perforating granulations of Pacchioni in the left parietal bone of I 469
6. X-ray of the perforating granulations of Pacchioni of I 469



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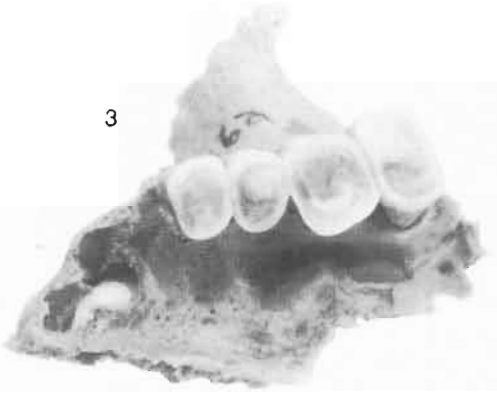

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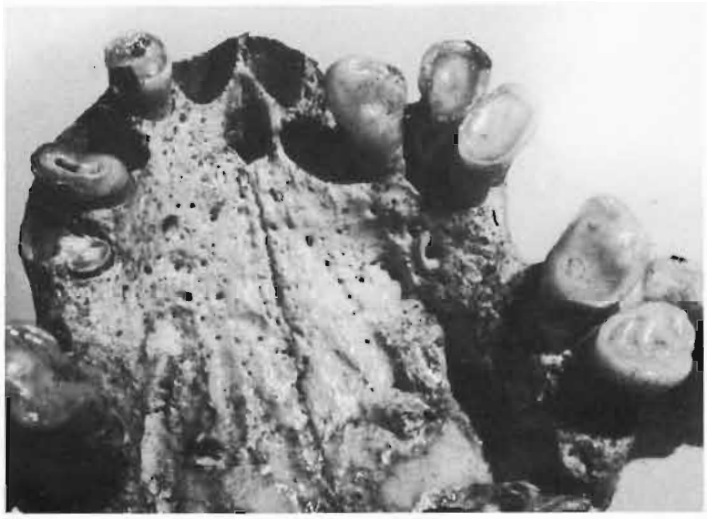
1. Hypodoncy of the upper right P_1 of A 10
2. X-ray of the hypodoncy of the upper right P_1 of A 10
3. Retention of the left C in A 36/6 a
4. Anomalous position of the lower left M_3 in a young male J 1947 with premature loss of back teeth probably due to paradontosis
5. Retention of both lower C and lower left M_3 in I 444
6. Hypodoncy of the lower right I_2 with shift and rotation of the adjacent C in A 21 d



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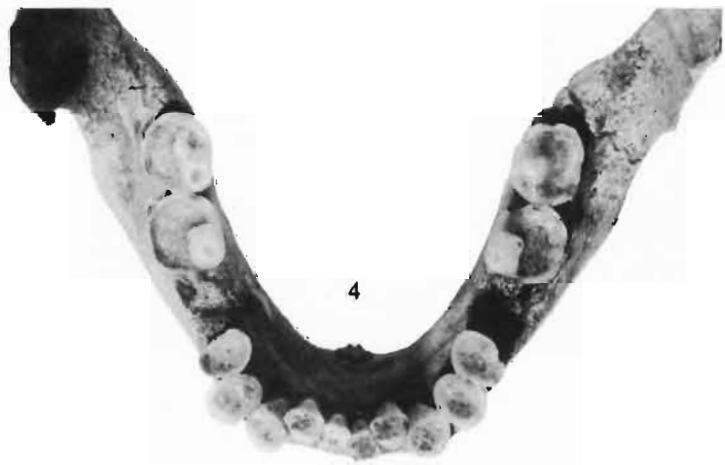

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1. Ectopic eruption of the upper left C in I 452
2. Narrow position of the lower front with rotation of both C and lower left M_3 in I 411
3. Narrow position of the lower front with rotation of both C and lower left M_3 in I 412
4. Narrow position of the lower front with buccal shift of the lower right P_1 in D 334. Note the strong attrition.
5. Narrow position of the lower front with lingual shift of lower right I_2 and P_2 in J 1967. Note the strong attrition only in premolars and frontal teeth.

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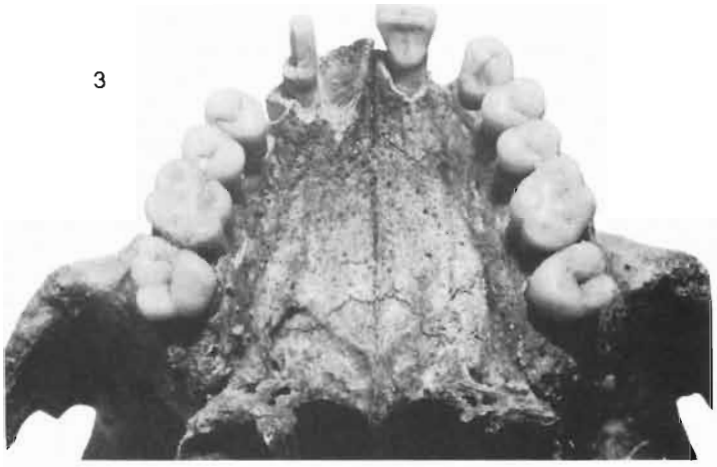

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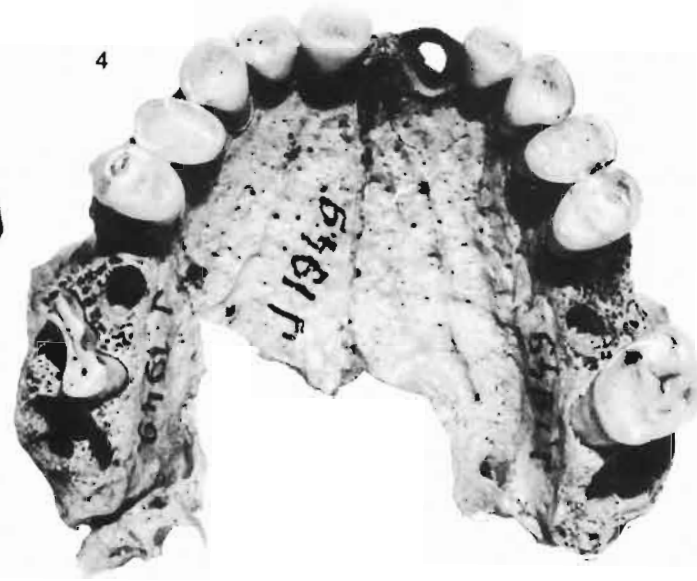
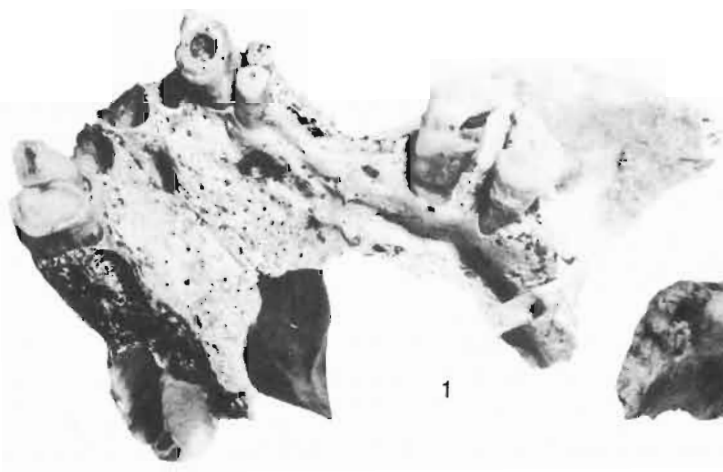
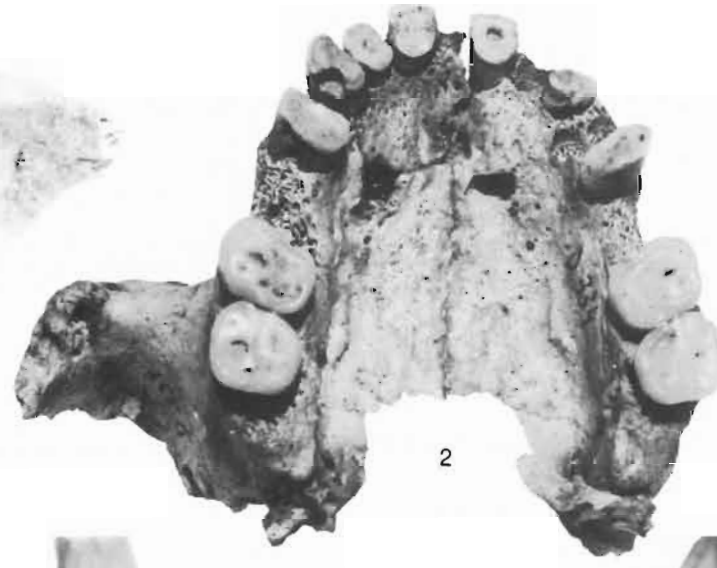
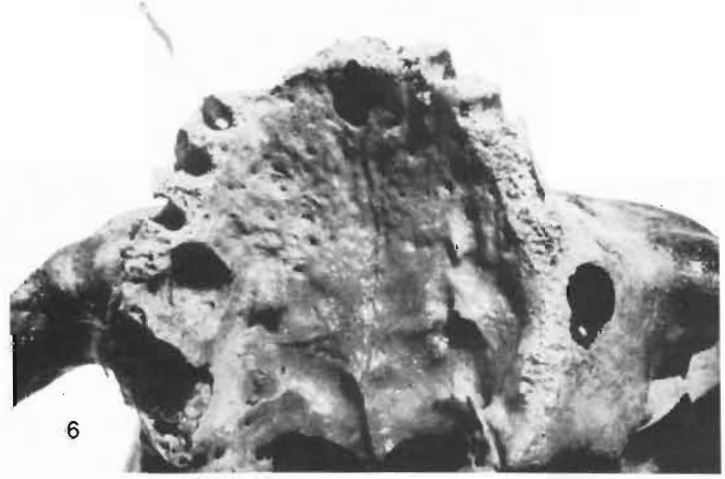
1. Enamel perl on the upper left m_1 of a 4—5 year old child A 36/10 a
2. Shovel-shaped upper I_2 and buccal shift of upper right P_3 of a 16—17 year old girl A 44/1 a
3. Anomalous shape of the upper right M_2 of I 407/1
4. Reduced peg-shaped upper right M_3 of J 1946
5. Reduced upper right M_3 of A 44/2 b
6. Reduced lower right M_3 of D 130 a



1-2. Dentition with heavy attrition of a 30—35 year old female. Intravital losses were caused by the attrition.
3. Dentition with slight attrition showing psalidodoncy and normocclusion of a 25—30 year old female I 461. Note depositions of dental calculus on the frontal teeth.
4. Upper dentition with heavy attrition of a 28—32 year old male I 1949
5. Lower dentition with heavy attrition of a 30—40 year old female J 1891
6. Lower dentition with heavy attrition of premolars and frontal teeth of male J 1949







1. Bad dental health of a 30—35 year old male I 457. Heavy attrition combined with approximal caries of upper left M_2 and M_3; the loss of upper left P_2 and M_1 could be caused by attrition or by caries

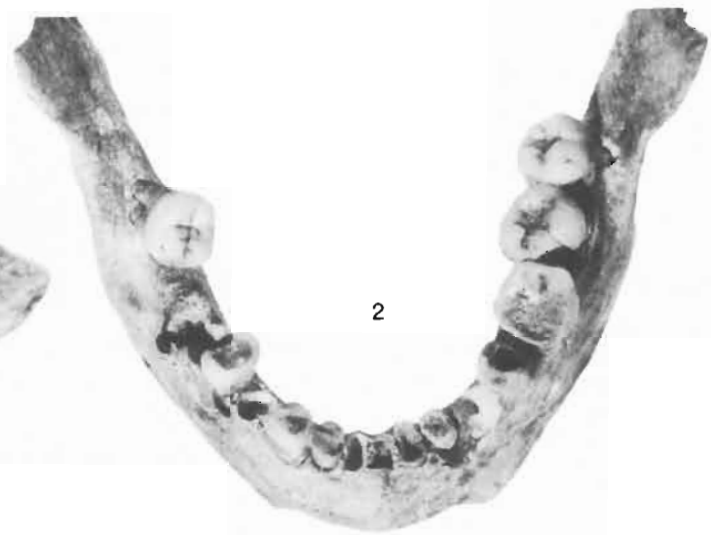
2. Upper dentition with heavy attrition of premolars and frontal teeth of a 30—40 year old male D 334. At the same time, fistulae on both sides of the palate draining abscesses from cysts at both P_1 can be observed

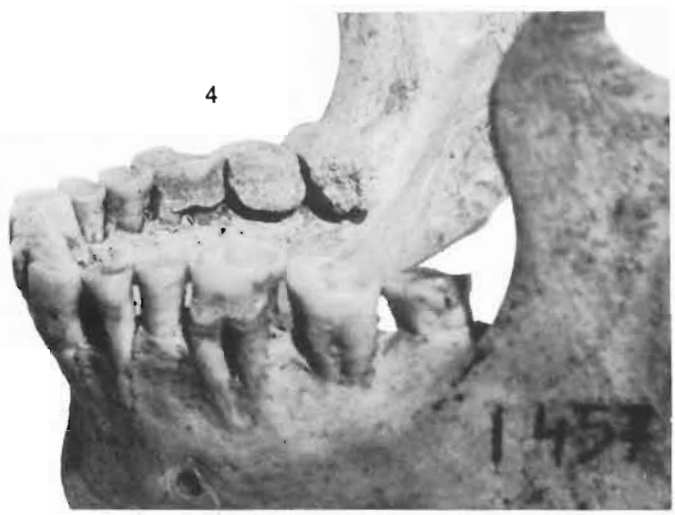
3. Two pairs of approximal caries (lower left I_2 and C, as well as P_2 and M_1) and intravital losses of several teeth with a longitudinal cyst in the place of lower right I_2 to P_1 of a 30—50 year old female I 406

4. Fistula draining the periapical abscess at lower left I_2 with an occlusal caries. Other fistulae around the roots of the remaining incisivi are the result of heavy attrition. A distant fistula under the root of lower right C was caused by its pulp exposure due to attrition. Extreme attrition of approximal sides of the teeth. Such bad state of dental health was found in a 40—50 year old male A 13.

5. Large cyst at lower right M_2 communicating with the canalis mandibularis in a 40—50 year old male J 1976

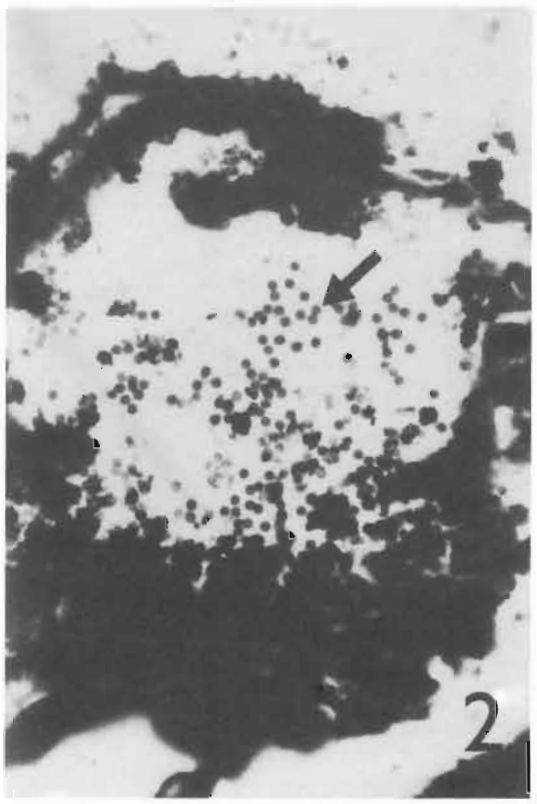
6. Large cyst at upper right M_1 on an edentulous upper jaw of a 40—50 year old male A 44/1 c





1—2. Early massive dental decay in a 25—30 year old male I 375
3—4. Dental calculus on lower molars of a 30—35 year old male I 457
5. Typical paradontal pocket around the buccal root of the upper left M_1 in a 30—40 year old male A 6
6. Complete atrophy of lower dentition with almost smooth surface in a 50—60 year old female J 1960

1



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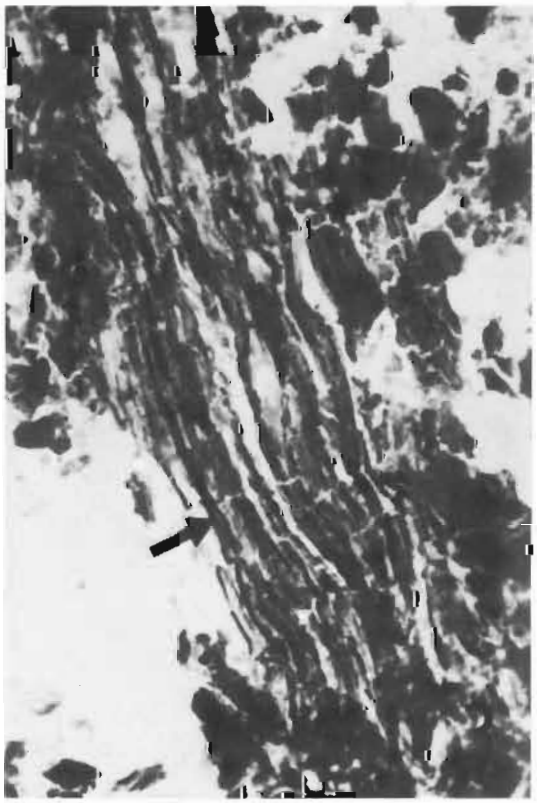

3

4

1. Thin section of skin displaying the location of hairs of J 1890 (x 65)
2. Thin section of an agglomeration of erythrocytes of I 375 (x 150)
3. Thin section of muscle fibres of J 1744 (x 150)
4. Thin section of brain tissue displaying the location of blood vessels of J 1894 (x 65)

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